THE FACE-IN-THE-CROWD AND ANXIETY AND COGNITION

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ABSTRACT

Hansen and Hansen (1988) found that angry targets in happy crowds were found more quickly and accurately than happy targets in angry crowds. This finding, they dubbed the Face-in-the-Crowd effect. Gilboa-Schechtman and colleagues (1999) found that high anxious participants show a greater enhancement of detecting angry versus happy targets. The purpose of the current studies was to replicate these findings, and to determine whether Rational and Experiential decision-making styles play a role in target detection (Study One) and crowd searching (Study Two), and if these decision-making styles interact with affective predisposition for both reaction time and galvanic skin response in the face-in-the-crowd task. In Study One, I replicated the anger superiority effect and the Anxiety x Target interaction. I also found that the Rational Group tended to be faster than the Experiential Group overall. I found that the High Trait Anxious group had higher GSR than the Low Trait Anxious group averaged over both target conditions. The Rational group had higher GSR when presented with happy targets than when presented with angry targets whereas the Experiential group did not show this difference. In Study Two, I failed to replicate the anger inferiority effect of crowd searching, but I did find that the Rational group tended to be faster than the Experiential group, especially for angry crowd searching. I also found that the Low-State-Anxious-Rational group had lower galvanic skin responses than all other groups across all analyses. The most exciting finding of these two studies was that he Rational Group demonstrated a facility for the face-in-the-crowd task, validating decision-making style as an important dimension to be considered in future face-in-the-crowd research. The research also provided support for network theories and it is hoped that future studies might endeavor to explore facial processing with this theoretical framework in mind.

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1. PREAMBLE

Over the past few decades, face processing has become an increasingly fruitful area of research in many areas of psychology, including neuropsychology, developmental, social, evolutionary, and cognitive psychology (Bruce, Cowey, Ellis & Perrett, 1992; Nelson, 2001). It is in the bringing together of neuropsychology, evolutionary and cognitive psychology that we begin to learn that some facial processing abilities, such as face recognition, may be considered biologically hard-wired (Segerstrale, 1997). As the communication and signaling function of facial affect has been important throughout our evolutionary history, some researchers suggest that we have become hard-wired for interpreting innate affect, and that it is the face that is the display board of the affective system (Nathanson, 1990).

Cognitive neuroscience has demonstrated that face recognition is subserved by discrete neural circuits, and therefore represents a specialized brain function (Nelson, 2001). Evidence that face recognition is a special case of object perception has been found through studies of intact and neurologically impaired individuals (Farah, 1996; Moscovitch, 1997), animal studies (Pascalis & Bachevalier, 1998), and developmental studies (Johnson and Morton, 1991).

Neurologically intact individuals are better able to recognize faces as a complex whole, rather than faces that are decomposed into constituent elements, and are also better at recognition performance when objects are presented upside down as opposed to when faces are presented upside down (Valentine, 1998). Neurologically impaired individuals, such as those with a prosopagnosia, frequently have accompanied damage to the ventral occipitotemporal and temporal cortex. Specifically, neuroimaging studies using fMRIs have shown increased oxygenation and activation in the fusiform gyrus during face recognition tasks (Nelson, 2001).

Behavioural studies with monkeys have been important to the study of facial processing because both humans and monkeys use their faces to communicate and produce a range of social signals (Nelson, 2001). Non-human primates may rely on facial processing to an even greater degree than humans, as they lack spoken language as a means of communication (Nelson, 2001). Interestingly, in a study by Pascalis and Bachevalier (1998), like humans, monkeys also showed increased activation in the fusiform gyrus area of the brain during facial recognition tasks, and results also suggested that humans did better than monkeys in recognizing human faces, whereas the converse was true for monkeys.

Developmental studies of facial processing help to determine whether facial recognition is innate or learned. Developmental studies have demonstrated that by around 4 months of age (after visual acuity and contrast sensitivity has had time to develop), infants recognition of upright faces is superior to upside down faces (Fagan, 1972), their ability to distinguish caregiver from stranger becomes more robust (Maurer & Salapatek, 1976), and they can begin to categorize facial expressions (Ludemann & Nelson, 1979). Farah, 2000, suggests that there are critical periods in which facial recognition abilities develop in the brain, and early damage to these brain regions results in long-term impairment, and that this, in turn, leads to an assumption that face recognition is an innate ability.

Although face recognition may be an innate ability subserved by the fusiform gyrus, cognitive neuroscience has demonstrated that facial emotion recognition has slightly different underlying neural substrates. Neuroimaging studies have collectively shown that the amygdala plays a role in the recognition of facial expressions (Nelson, 2001). More specifically, Whalen and colleagues, 1998, reported increased activation in the amygdala to fearful faces, but *decreased* activation of the amygdala in to happy faces. The evolutionary argument would postulate that this emotional activation in the amygdala to fearful stimuli would spur mobilization of resources to quickly deal with threat and increase the odds of survival. In support of differing neural activation based on fearful stimuli, LeDoux (1996), delineated a neural network in rodents that may route fear-related stimulus information monosynaptically via the thalamus to the amygdala, thus bypassing the slower multisynaptic pathway via the cortex (Ohman, Flykt & Lundqvist, 2001).

The aforementioned studies are but a handful of research that has come to suggest that facial expression recognition has become biologically hard-wired, and that the communication and signaling function of facial affect has been important throughout our evolutionary history. The manner in which our brains sense, perceive, attend, and respond to facial stimuli, both affectively and cognitively is an exciting arena for research.

The following research lies in this area of affect, cognition, and face-processing. It seeks to combine advances in affective and cognitive theory with current face processing research. Specifically, two relatively new models of the interaction of affect and cognition, the Affective Infusion Model (AIM; Fogas, 1995) and Cognitive-Experiential Self-Theory (CEST; Epstein, 1992) will provide structure for two face processing studies that follow from previous studies that utilize the face-in-the-crowd paradigm.

The face-in-the-crowd paradigm is an experimental protocol whereby participants are asked to identify target emotional faces in a stimulus array of faces. As such, this document will review the original face-in-the-crowd studies; provide a brief review of relevant affective and cognitive theories pertaining to the proposed research; suggest the usefulness of the network theories, AIM and CEST, for interpreting face-in-the-crowd paradigm; and detail the rationale for the two current studies. After this introduction, the document will contain a methodology section for the studies, a results section illuminating the statistical findings, followed by a discussion integrating the literature, theory, results, strengths and limitations of the present research as well as suggestions for future inquiry.

2. THE FACE-IN-THE-CROWD

2.1 A Brief Overview of the Original Face-in-the-Crowd Studies

2.1.1 Evolutionary Significance of Facial Threat Detection and the Face-in-the-Crowd Paradigm

Previous research suggests that the ability to send and receive emotional signals has survival value and that the detection of human faces has become highly practiced, if not hard-wired in the human perceptual system (Hansen & Hansen, 1988, Horna, Haver, & Schwartz, 1976; Purcell & Stewart, 1981, 1986; Purcell, Stewart, Botwin, & Kreigh, 1983; Zajonc & Markus, 1984). It has been argued that this ability to detect faces should be maximized when the facial emotion conveys a potential threat (Schwartz, Izard, & Ansul, 1985). Hansen and Hansen (1988) were interested in the biological significance of the interindividual transmission of emotional signals. Hansen and Hansen (1994) believed that facial displays of emotion are prototypical biologically significant social stimuli and that differential styles may have evolved for the processing of threatening versus non-threatening facial displays.

In the case of facial displays of threat, automatic processing could have adaptive advantages. The authors explained that automatic processes are simple, fast, nonflexible, and efficient, and evolution would favor this type of processing because it would aid in the detection of and responses to threats to an individual's survival. They hypothesized that if facial threat detection is automatic then an angry face would pop out of a crowd because it is preattentively processed in a parallel search, i.e., the stimuli would be simultaneously processed before reaching cognitive awareness. Here it is important to note that parallel processing is an automatic cognitive process that is not to be conceptually confounded with nonconscious processing. Automatic parallel processes can be either preconscious or postconscious (Bargh, 1989; Hansen & Hansen, 1994); although at the nonconscious level, automatic processes might be capable of instigating activity in noncognitive response systems, such as the autonomic system (Ekman, 1992; Ekman, Levenson, & Friesen, 1983; Hansen & Hansen, 1994; Levenson, 1992) or may be capable of influencing the allocation of controlled processing resources by orienting conscious attention (Hansen & Hansen, 1994; Pratto & John, 1991; Roskos-Ewoldsen & Fazio, 1992; Shiffrin & Schneider, 1977).

In the case of non-threatening facial displays, no such automatic processing would be necessary, and the authors hypothesized that a happy face would not pop out of a crowd, but would instead be detected by the controlled processing resources in the course of a serial search. A serial search occurs when attention is routed to stimuli serially through attentional shifts.

To study the concept of differential processing styles, Hansen and Hansen (1988) designed a task called the "face-in-the-crowd" where participants were required to find target emotional faces in a stimulus array of distracter faces. In separate studies, participants were asked to report the presence or location of a target emotional face amidst a crowd of distracters consisting of another emotional expression. For example, participants were asked to locate a happy target in an angry crowd or an angry target in a happy crowd. Hansen and Hansen (1988) expected to find an anger superiority effect in the participants' reaction time (RT) in locating targets. If angry targets were being processed automatically in a parallel search, then they hypothesized the time it would take to locate the face would be relatively faster. If happy targets were being processed through an exhaustive serial search with many attentional shifts, then the time it would take to locate the face would be relatively longer.

2.1.2 Hansen and Hansen: Finding a Discrepant Emotional Face in the Crowd

In the seminal study, Hansen and Hansen (1988) were interested in finding the basic anger superiority effect in facial processing. They showed participants a 3x3 crowd comprising faces of different persons on a tachistoscope. Participants were asked to verbally report whether there was a discrepant emotional face. The targets and crowds could consist of happy, neutral or angry facial expressions. Fifty-four trials contained an array of faces displaying a discrepant emotion (target) from that of the crowd, and 54 trials contained an array of faces all displaying the same emotion (no target). For each crowd type, each of the two targets would appear in each position in the 3x3 matrix at random. For example, for a happy crowd, there would be nine angry target trials, nine neutral target trials, and 18 trials that contained no target. Participant RT to report the presence or absence of a target were recorded and differences in RTs of the various target and crowd combinations were analyzed.

Consistent with their hypotheses, findings from this first study indicated an anger superiority effect in the ability to detect a discrepant emotional face. Hansen and Hansen reported that participants found angry targets in neutral crowds faster and with fewer errors than neutral targets in angry crowds; and found angry targets in happy crowds faster and with fewer errors than happy targets in angry crowds. However, contrary to their hypotheses, they also found that participants did not find angry targets faster than neutral targets in happy crowds. In terms of crowd analysis, Hansen and Hansen found that participants responded faster when the crowd was happy than when the crowd was angry (indicating that participants may have been slowed by multiple angry faces versus multiple happy faces); but responded equally fast when the crowd was angry as when the crowd was neutral. From this first study, the authors suggest that the predicted anger superiority effect emerged from the data, and that the threat-detection orientation of face-processing tended to be supported.

2.1.3 Hansen and Hansen: Threshold to Reporting the Location of a Discrepant Face

In a second study reported in Hansen and Hansen (1988), researchers were interested in finding an anger superiority effect of facial processing by using a threshold paradigm. They showed participants a 2 x 2 crowd of faces comprised of photographs of the same person on a tachistoscope. Participants were asked to verbally report the location of a discrepant emotional face, which required a forced choice of either upper right, upper left, lower right or lower left. Trial conditions consisted of either a happy face imbedded in a crowd of angry faces or an angry face embedded in a crowd of happy faces. Two sets of male photographs were used with each set containing the same person displaying angry and happy facial expressions. There were six replications for each condition with the target located in each position, making for a total of 48 trials per set of photographs, or 96 trials in total. The order of exposure to face-in-the-crowd condition and person (set of photographs) was randomly determined per participant. Trials were displayed on the tachistoscope for increasing durations (in 10 msec steps) and the necessary exposure duration for correct determination of the location of a discrepant face (location threshold) for the various condition and person combinations were analyzed.

Consistent with their hypotheses, findings from this second study indicated an anger superiority effect in the threshold to detect a discrepant emotional face. Hansen and Hansen reported that participants located the discrepant angry target in the happy crowd more quickly and easily than the happy target in the angry crowd. However, there was also a main effect of person, in that the anger superiority effect was observed for only one set of photographs. The authors hypothesize that this could be due to the greater emotional expressiveness of the person in one set of photographs. From study two, Hansen and Hansen (1988) suggest that an angry target better attracts attention in a crowd of happy faces, but a crowd of angry distracters may also serve to distract attention from a happy target.

2.1.4 Hansen and Hansen: Examination of Parallel and Serial Search Strategies

In a third study reported in Hansen and Hansen (1988), researchers were interested in investigating the underlying process in the production of the anger-superiority effect. Specifically, they wanted to test if angry targets were automatically processed in a parallel search and if happy targets required the controlled processing resources of a serial search. The authors explained that as a parallel search does not necessitate attentional shifts it should be completed more rapidly than a serial attentive search regardless of the size of the stimulus array (Hansen & Hansen, 1988), whereas the time to locate a target in a serial search would be a function of the size of the stimulus array. They hypothesized that the angry target should pop out with about the same latency in small and large happy crowds because a parallel search will orient the participant to the angry target regardless of the size of the stimulus array. In contrast, the size of the angry crowd would greatly influence the latency to detect a happy target because a parallel search of an angry crowd would not render the happy target distinct, necessitating a subsequent longer serial attentive search. Hansen and Hansen showed participants small crowds (2x2) and large crowds (3x3) comprising faces of the same person on a tachistoscope. Participants were asked to verbally report whether there was a discrepant emotional face. The targets and crowds could consist of happy or angry faces. One hundred and forty-four of the trials contained an array of faces displaying a discrepant emotion (target) from that of the crowd, and 144 trials contained an array of faces all displaying the same emotion (no target). Half of the trials were 2x2 arrays and half were 3x3 arrays. In the 2x2 array, a target would appear in each of the four positions a total of nine times and in the 3x3 array, a target would appear in each of the nine positions a total of four times. Participant RT to report the presence or absence of a target were recorded and differences in RTs of the various target and crowd, and array size combinations were analyzed.

Consistent with their hypotheses, findings from this third study indicated an anger superiority effect in the ability to detect a discrepant emotional face, regardless of array size. Hansen and Hansen reported that in congruence with study one, angry targets in happy crowds were discovered faster than happy targets in angry crowds. And, importantly, the time to discover an angry target in a crowd of eight happy distracters was no longer than the time to discover an angry target in a crowd of three happy distracters whereas the time to discover a happy target in a crowd of eight angry distracters was significantly longer than the time to discover a happy target in a crowd of three angry distracters. In terms of crowd analysis, Hansen and Hansen found that participants responded faster when the crowd was happy than when the crowd was angry (indicating that participants may have been slowed by multiple angry faces versus multiple happy faces). From this third study, the authors suggest that not only did an anger superiority effect emerge from the data, but that it is likely that angry faces pop out of crowds in a parallel search, whereas happy faces do not pop out, and require serial processing.

2.1.5 Limitations to the Hansen and Hansen (1988) Studies

The dark and light confound. There were, however, some limitations to the Hansen and Hansen (1988) studies that cast doubt on the strength of the claim that there is an anger superiority effect in facial processing. Purcell, Stewart, and Skov (1996) expressed concern that the emotional facial stimuli used by Hansen and Hansen (1988) were confounded with light and dark areas in the photographs. Specifically, the angry face may have popped out of the crowd because of a contrast artifact produced by a dark area not present in the happy photographs. The dark area was due to a difference in lighting when the photographs were taken and tended to draw the eye. This dark area contrast was also more pronounced for one of the sets of individuals in study two and could explain why there was a main effect of person. In fact, when Purcell and colleagues (1996) attempted to replicate the study by using similar methodology but controlling for the light and dark confound by gray-scaling the photographs, they found no anger superiority effect and suggested that it takes a confounded face to pop out of a crowd. As a result of Purcell and colleagues (1996) finding, numerous studies have subsequently been conducted using schematic faces (e.g., Eastwood, Smilek, & Merikle, 2001; Fox et al., 2000; Northdurft, 1993; Oehman, Lundqvist, & Esteves, 2001; White, 1995;) or with photographs in which there is no confound of light and dark (e.g., Byrne & Eysenck, 1995; Gilboa-Schechtman, Foa, & Amir, 1999; Hampton, Purcell, Bersine, Hansen, & Hansen, 1989; Hansen & Hansen, 1994, Oehman, Lundqvist, Esteves, 2001) to control for confounding qualities that may be inherent in the stimuli. After controlling for the confound, nine out of ten of these studies concluded that there is likely an anger superiority effect, although this conclusion is somewhat tentative, as the effect tended to hold up in some of the researchers' analyses, but not all.

Sample size. A second limitation of the original Hansen and Hansen (1988) study is that of sample size. With sample sizes of 19 (experiment one), 12 (experiment two) and 10 (experiment three), Purcell and colleagues (1996) wonder whether statistical power should also be a concern. For example, in their third study, Hansen and Hansen accepted the null hypothesis that there was no difference between RTs in the 2x2 and 3x3 array sizes for angry targets. Although the effect size was large ($\eta^2 = 0.15$), their sample size provided meager power ($1-\beta = 0.54$) to make the leap and accept that there is no difference between these two matrix sizes (the null hypothesis).

2.1.6 Unanswered Questions from the Hansen and Hansen (1988) Studies

Holistic face versus feature recognition. There remain a number of questions unanswered from the original Hansen and Hansen (1988) studies. Firstly, Hansen and Hansen (1988) acknowledge that the findings do not address whether it is the face as a whole that is being processed, or if some feature of the face, for example the brow, is responsible for the anger superiority effect. A number of researchers have attempted to investigate the feature versus holistic face question using the face-in-the-crowd paradigm and facial stimuli containing scrambled features, containing only certain features, or containing inverted faces (e.g., Eastwood et al., 2001; Fox et al., 2000; Northdurft, 1993; White, 1995). Northdurft (1993) found that the face was not being processed holistically, and that individual features play a significant role in RT. White (1995) found support for both feature and holistic facial processing and suggests that facial valences are analyzed at an early stage of stimulus encoding. Fox and colleagues (2000) and Eastwood, Smilek, and Merikle (2001) found evidence in support of faces being processed holistically in that the anger superiority effect was observed only with angry faces or with negative faces that were not inverted (facial inversion interferes with emotional perception; Fox et al; 2000).

Automatic versus controlled processing. Hansen and Hansen (1988) acknowledged that the underlying processes of the anger superiority effect needed further investigation. Though the response latencies for the face-in-the-crowd paradigm seemed to suggest that angry faces are processed automatically through a parallel search, they called for further research to be conducted using convergent paradigms to demonstrate more conclusively that angry expressions pop out of crowds at an automatic level of processing.

Hampton, Purcell, Bersine, Hansen and Hansen (1989) probed the pop out effect by examining if there were any target position effects within small (2x2) and large (3x3) arrays. They conducted a face-in-the-crowd study using similar methodology as the third study of Hansen and Hansen (1988), with the notable exception that they took steps to eliminate the dark and light confound. Though they did find an anger superiority effect such that angry targets were found faster in happy crowds relative to happy targets in angry crowds, they also found that the position of the target within the array had an effect on RT in the nine-face array. Those trials that contained targets in the top row of the array were located faster than trials containing targets in the bottom row of the array, suggesting that subjects were consciously scanning from top to bottom. From these findings, Hampton and colleagues (1989) explain that though angry targets were found faster, there was no conclusive evidence for the pop out or automatic processing of angry faces.

To further examine parallel versus serial processing of angry faces, Hansen and Hansen (1994) decided to try a new marker of the operation of automatic processes for the detection of angry faces. They constructed a different paradigm wherein participants were exposed to two faces in each trial, one on the right side of a computer screen, and one on the left side. Both faces were a distance from the initial fixation point that necessitated an attentional shift to be seen. Participants were given the conscious processing task to detect pre-determined targets: angry faces during one block of trials, and happy faces in a second block of trials. Half of the trials contained faces displaying the same emotion on both the right and left, and half the trials contained faces displaying different faces on the right and left. Hansen and Hansen used saccadic eye movements, measured by electrooculographic (EOG) signals to record the direction of the initial saccade from the fixation point to determine whether the initial saccadic jump was in the direction of the pre-determined target, and they also recorded the latency to move of the saccadic jumps to determine how long it took a participant to shift their eyes toward and away from the pre-determined target.

Although there was no main effect of target such that participants were about as likely to shift their eyes to a happy face as to an angry face, there was an important finding regarding latency to move. The latency of saccades *toward* angry faces was shorter than the latency of saccades toward happy faces; and the latency of saccades *away from* angry faces was longer than the latency of saccades away from happy faces. As a result, Hansen and Hansen suggested that although angry faces did not force the reorientation of attention, they did attract attention as the result of automatic processing. Moreover, at the level of controlled processing, there was an anger inferiority effect in that it took longer to saccade away from angry faces, suggesting that it takes longer to process an angry face than a happy face.

In a second experiment measuring saccadic movement and latency to move, Hansen and Hansen (1994) were interested in the effect of controlled processing in the appraising and naming of emotional faces. In this study, participants were presented with an experimental paradigm similar to the methodology Hansen and Hansen (1994) used in their previous eye movement study, but with the added controlled processing activity of appraising and naming the emotion of the targets. Here there was a main effect of controlled processing condition such that processing times were significantly longer when participants had to appraise and name the emotions versus merely reporting if the faces were same or different; and importantly there was also a main effect of intersaccade times (time spent on the first target) such that participants dwelled longer on the first target if it was angry rather than happy. Hansen and Hansen discussed two possible explanations for this finding. The first explanation postulates that participants may dwell longer on angry targets because they are more difficult to process, either because they are uniquely complex, or because there is less accessibility of memorial representations of threat. The second explanation postulates that facial threat may receive more extensive controlled processing because it has power to maintain itself as a focus of attention (i.e., threat may attract attention at the level of automatic processing, and then maintain itself as a focus of attention when controlled processing begins). Collectively, the two studies conducted by Hansen and Hansen (1994) suggest an anger superiority effect at the level of automatic processing (angry faces orient attention automatically) and an anger inferiority effect at the level of controlled processing (angry faces require more controlled processing, making it harder to look away).

Cognitive versus affective processing. Hansen and Hansen (1988) acknowledge that from their original three studies it remains unclear whether the anger superiority effect is the result of cognitive or affective processes. To investigate this question, seminal studies conducted to determine the degree to which affective processes play a role in the detection of facial expressions were carried out by Byrne and Eysenck (1995) and Gilboa-Schechtman and colleagues (1999).

Byrne and Eysenck (1995) were interested in examining whether individuals with state or trait anxiety would have facilitated processing of facial threat in the face-in-the-crowd task in comparison to low anxious individuals. They pre-selected and categorized participants into a high trait anxious and a low trait anxious group based on participants' scores on the Trait Scale of the State-Trait Anxiety Index (STAI; Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983). To ensure that it was the effects of anxiety and not depression that were being evaluated, participants were also administered the Beck Depression Inventory and the analyses were run with and without depression partialled out. Byrne and Eysenck showed participants a 4x3 crowd comprising faces of different persons on a computer screen. Participants indicated the presence and the location of a discrepant emotional face (the target) by pressing computer keys numbered one to twelve that were arranged in the same manner as the presented array. Participants pressed the spacebar key to indicate absence of a target. The targets and crowds could consist of happy, neutral, angry, or anger mixed with disgust facial expressions. There were five blocks of 24 trials. Twelve trials in each block contained an array of faces displaying a discrepant emotion (target) from that of the crowd, and 12 trials contained an array of faces all displaying the same emotion (no target). For each block, the target would appear in each position in the 4x3 matrix at random. The five blocks were as follows: angry target in a neutral crowd; happy target in a neutral crowd; both types of target in a neutral crowd; angry target in a happy crowd; and happy target in an angry crowd. Participant RTs to report the presence or absence of a target were recorded and differences in RTs of the various group, target and crowd combinations were analyzed.

Although findings indicated the opposite of the anger superiority effect in that happy targets were detected faster than angry targets in neutral crowds, Byrne and Eysenck found a significant Group x Target interaction such that high trait anxious participants detected angry targets faster than their low trait anxious counterparts; the two groups did not differ on their speed at finding happy targets (see Figure D-1).

They also reported a significant Group x Crowd interaction. High trait anxious participants were significantly faster at locating an angry face in a happy crowd than a happy face in an angry crowd. However, the low trait anxious participants did not differ in their response times over both crowd conditions.

In a second study using similar methodology, Byrne and Eysenck (1995) found that anxious mood induction through music (i.e., the manipulation of state anxiety), as measured by the state scale on the STAI, did not have any appreciable effect on RTs in the face-in-the-crowd paradigm. From these two studies, Byrne and Eysenck suggested that although the manipulation of state anxiety had no effect on the detection of facial expressions, high trait anxious individuals have facilitated ability to detect an angry target in a crowd but impaired performance to crowds of angry faces in comparison to their low trait anxious counterparts.

A second set of studies to determine the degree to which affective processes play a role in the detection of facial expression was conducted by Gilboa-Schechtman and colleagues (1999). Gilboa-Schechtman and colleagues were interested in examining whether individuals with social phobia would have facilitated processing of facial threat in the face-in-the-crowd task in comparison to normal controls. They pre-selected and categorized participants into a generalized social phobia group and a nonanxious control group based on their scores on the Structured Clinical Interview (SCID; First, Spitzer, Gibbon, & Williams, 1995).

Gilboa-Schechtman and colleagues showed participants a 4x3 crowd comprised of faces of the same person on a computer screen. Participants indicated the presence or absence of a discrepant emotional face by pressing computer keys marked "different" (one face displays a discrepant emotional expression) or "same" (all the faces display the same emotional expression). The targets could consist of happy, neutral, angry or disgust facial expressions, and crowds could consist of happy, neutral, or angry facial expressions. There were three blocks of 72 trials. Each block represented a different emotional crowd. Half of the trials in each block contained an array of faces displaying a discrepant emotion (target) from that of the crowd, and half of the trials contained an array of faces all displaying the same emotion (no target). For each block, all three targets would appear in each position in the 4x3 matrix a total of one time at random. Participant RTs to report the presence or absence of a target were recorded and differences in RTs of the various group, target and crowd combinations were analyzed.

Results of this study showed an overall anger superiority effect such that for both groups angry targets were detected faster than happy targets in neutral crowds. A significant Group x Target interaction emerged such that those participants with generalized social phobia detected angry targets faster than their nonanxious counterparts. However, the two groups did not differ on their speed at finding happy targets (see Figure D-2).

Results of this study also show a significant Group x Crowd interaction such that those participants with generalized social phobia were slowed by the processing of multiple emotional faces (either angry or happy crowds) versus the processing of multiple non-emotional faces (neutral crowds), whereas their nonanxious counterparts did not differ in the speed of their emotional versus non-emotional crowd processing.

As part of their analyses, Gilboa-Schechtman and colleagues calculated a beta value to determine if participants had a response bias in terms of the relative cost of false positive versus false negative decisions. This was an attempt to discover the cognitive processes, in terms of decision-making style, that could be at work in conjunction with the affective processes. It was found that there were no group differences in response bias suggesting that the observed differences in the ability to detect angry faces is indicative of biased attentional processing rather than biased decision-making style.

Though calculating a beta score for response bias provides some insight into the decision-making style of participants, it remains unclear as to the degree that affective and cognitive processes are working in conjunction to contribute to the biased attentional processing response patterns within the anxious participants. For example, an affectively anxious individual employing a strongly cognitively controlled decision-making style may have a different response pattern than an affectively anxious individual responding relatively automatically. Though the studies conducted by Byrne and Eysenck (1995) and Gilboa-Schechtman and colleagues (1999) demonstrated that participants who have differing affective traits responded differentially to displays of facial threat, it is uncertain if this was due to an affective component, a cognitive decision-making style, or both.

Facial processing and physiological arousal of non-cognitive response systems. As part of on-going research, Hansen and Hansen have started an investigation into the interconnections between facial processing and non-cognitive response systems. Specifically, while conducting the electro-oculographic face-in-the-crowd study (1994), Hansen and Hansen also measured automatic facial efference using facial electromyography. Here, they noted facial displays of anger resulted in higher automatic activity in the left corrogator supercilii muscle than facial displays of happiness. This muscle is used to pull the eyebrows down and inward and is usually associated with negative emotion (Hansen & Hansen, 1994). They concluded that automatic facial processing can enervate the facial muscle system, and postulated that automatic facial processing may activate other non-cognitive response systems.

Hansen and Hansen were not the only researchers interested in the possibility of automatic physiological arousal during the face-in-the-crowd task. Gilboa-Schechtman and colleagues (1999) outline studies that have been conducted to investigate enhanced physiological responsivity to aversive conditioning in general, but call for research in the arena of facial processing to examine physiological reactivity to negative facial expressions for anxious individuals and non-anxious controls. Whatever the underlying affective and/ or cognitive processes of the face-in-the-crowd findings, it would be interesting to simultaneous consider any accompanying physiological effects.

2.2 A Brief Review of Affective and Cognitive Theories of Emotion

To help illuminate whether the anger superiority effect in the face-in-the-crowd task is the product of an affective component, a cognitive decision-making style, or both, it is important to look to the literature concerning affective and cognitive theories of information processing. Prominent theories involving affective and cognitive information processing that are important to consider are: Darwinian and evolutionary, Jamesian and physiological, cognitive appraisal, attributional, and network theories.

Darwinian and evolutionary theorists postulate that the affective system has developed in response to environmental contingencies and that some emotions that have survival value have become biologically hard-wired (Cornelius, 1996, Fridlund, 1994). Evidence for the biological preparedness of some emotions comes from studies demonstrating the universality of some facial expressions, most notably the Big Six: happiness, sadness, anger, fear, disgust, and surprise (Cornelius, 1996). Ekman and his colleagues are pioneers in this area, demonstrating that core facial expressions are constant across cultures. Ekman and Friesen have studied, researched and photographed these universal expressions and it is from the collection of photographs of facial expressions of Ekman and Freisen (1975) that the facial stimuli for many face-in-the-crowd studies have been selected (e.g. Byrne and Eysenck, 1995; Gilboa-Schechtman et al., 1999; Hampton et al., 1989; Hansen & Hansen, 1988; Hansen & Hansen, 1994).

Jamesian and physiological theorists postulate that the experience of emotions has accompanying autonomic nervous system arousal (Cornelius, 1996), and that this arousal can inform subjective feeling, cognitions, and behaviour (Oehman & Soares, 1994). It has been empirically demonstrated that there is a limited set of autonomic differences among emotions (Levenson, 1992). Oehman and Sores (1994) used a backward masking technique to block conscious recognition of a feared stimulus, and established that autonomic arousal as evidenced by increased galvanic skin response (GSR) could be experienced without conscious appraisal. Autonomic arousal indicates that changes in the environment have been appraised by an individual at a basic "automatic" level, and this leads to an emotional state that can then bring together networks of association and memory that determine motivation and behaviour (Levenson, 1992). Autonomic arousal will be empirically examined in the current project by means of GSR.

Cognitive and appraisal theorists postulate that it is the meaning ascribed to events that arouse emotion and subsequent motivations and behaviours (Cornelius, 1996). Emotions are elicited and differentiated according to any of a number of subjective criteria (Scherer, 1999). For example, events and objects may be appraised on qualities such as perceived benefit versus harm, presence versus absence of the event or object, and whether an event or object instigates an approach versus avoidance response (Scherer, 1999). Lazarus added to appraisal theory by asserting that appraisal involves two steps of processing. Primary appraisal is the discernment of how positively or negatively an object or event will impact one's well-being, and secondary appraisal is the belief about one's efficacy in dealing with the object or event (Scherer, 1999).

Attributional theory is a subset of cognitive and appraisal theory that postulates that it is predominantly the attribution of cause that elicits emotional reactions in the individual (Scherer, 1999). For example, an internal attribution of responsibility will elicit a different emotional reaction to an event or object than an external attribution of responsibility to the same event or object. The attributions made in the occurrence of negative events can lead to emotional distress such as depression or anxiety (Gotlib & Abramson, 1999). One element of the current project will be to examine the response of anxious participants (individuals who have a tendency toward negative appraisals and attributions) to affective stimuli.

Network theorists postulate that there is an associative network between affective and cognitive systems. Activated affective or cognitive "nodes" can activate (or "prime") associated nodes through a process called "spreading" (Gotlib & Abramson, 1999). The associations between nodes develop and become stronger through repeated use and shared activation, and the threshold for priming of an associated node becomes less with use. For example, "because individuals will often experience anxiety when processing information related to threat and danger, associative connections will develop between the anxiety node and nodes containing information about threat and danger" (Gotlib & Abramson, 1999; pp. 617). Network theories are important to the current project because they help to illuminate the important interaction between arousal, affect and cognition.

All the presented theories may provide some insight into the anger superiority effect of the face-in-the-crowd paradigm: evolutionary theories suggest the "why" (survival value), Jamesian theories suggest the physiological component (arousal), and cognitive theories suggest in which situations (when there is personal meaning). However, it is the network theories that synthesize these components into a functional and cohesive whole. Here, a special subset of network theories called dual process theories will be explained, and two dual process theories will be presented with the intent to examine their relevance and compatibility with the current research.

2.3 Dual Process Theories

Germane to the current project are a special subset of network theories called dual process theories. Dual process theorists postulate that there is often more than one underlying process spurring the wide variety of human behaviors (Gilbert, 1999). Despite the nomenclature *dual* process, most psychologists who advocate for dual process theories do not limit themselves to considering only two processes in a model, but often consider three, four or even five underlying processes (Gilbert, 1999). The important claim of dual process theory is simply that there is more than one factor influencing behavioral outcome. Past psychological inquiry has attempted to explain human behavior by examining multiple parts such as: cognition and emotion, reason and intuition, automaticity and control, consciousness and unconsciousness, and ego and id, in order to understand the complexity and vast array of human behavioral responses (Gilbert, 1999).

2.3.1 Four Dual Process Designs

According to Gilbert, 1999, dual process theories tend to fall into one of four different designs that can be explained in terms of the activation of underlying processes, and the degree to which a single process has control over behavioral output.

The selective design. The first design is the selective design. In the selective design, only one process is activated and it has sole control over behavioral output. In this instance, an individual may exhibit one behavior on one occasion and another behavior on another occasion dependent on which process is activated. There is a direct relationship between stimulus and process activation such that the same stimulus will always activate the same process. Although the individual has both processes available for use, while one is activated, the other remains dormant. For illustration, an individual may have a cognitive system and an emotional system. When presented with a mathematical problem, the cognitive system is activated and the emotional system remains dormant.

The competitive design. The second design is the competitive design. In the competitive design, both processes are activated, but only one process has control over behavioral output. In this instance, an individual may also exhibit one behavior on one occasion and another behavior on another occasion dependent on which process is activated. There is no direct relationship between stimulus and process activation, however, as the same stimulus may activate one process in one instance, and a different process under different circumstances. Although the individual has both processes available for use, the processes compete for supremacy and the right to be active. Once one process "wins" and becomes active, the other remains dormant. For illustration, an individual may have a cognitive system and an emotional system. When presented with a mathematical problem, the individual may have either a cognitive response (thoughts resulting in solving the problem) or an emotional response (math anxiety resulting in an inability to solve the problem). If the cognitive system is activated, there is no emotional response, and if the emotional system is activated, there is no cognitive response.

The consolidative design. The third design is the consolidative design. In the consolidative design, both processes are activated, and both processes have control over behavioral output. In this instance, an individual may exhibit one behavior on one occasion and another behavior on another occasion dependent on the relative activation of the various processes. There is no direct relationship between stimulus and process activation, however, as the same stimulus may activate each of the processes more in one instance, and less under different circumstances. The individual has both processes available for use, and the processes consolidate to produce the behavioral outcome. Both processes becomes active, the neither remains dormant. For illustration, an individual may have a cognitive system and an emotional system. When presented with a mathematical problem, the individual may have both a cognitive response (thoughts resulting in solving the problem) or an emotional response (math anxiety resulting in an inability to solve the problem). If the cognitive system controlled more of the behavioral outcome than the emotional system, it may take the individual relatively less time to complete the problem than if the emotional system controlled more of the behavioral outcome.

The corrective design. The fourth design is the corrective design. In the corrective design, *sometimes* both processes are activated, and *sometimes* both processes have control over behavioral output. As in the case of the consolidative design, an individual may exhibit one behavior on one occasion and another behavior on another occasion dependent on the relative activation of the various processes. There is a relationship between stimulus and process activation, as the design strives to achieve the optimum behavioral outcome for the same stimulus in all instances. As in the case of the consolidative design, the individual has both processes available for use, and the processes blend to produce the behavioral outcome, but in the corrective design, the output of one process may serve as the input for the another process to adjust for the optimum response. Both processes may or may not become active, and both processes may or may not remain dormant. For illustration, an individual may have a cognitive system and an emotional system. When presented with a mathematical problem, the individual may have both a cognitive response (thoughts resulting in solving the problem) or an emotional response (math anxiety resulting in an inability to solve the problem). In order to achieve the quickest solution to the problem, the two systems must achieve the proper mixture. If two parts cognitive response and one part emotional response will achieve the quickest math solutions, this outcome can be kept relatively constant when one system compensates for momentary variations in the product of the other process. For example, the individual may realize that he/she is over-thinking the math problem and this is hindering coming up with a solution, (too much cognitive system), this may in turn activate his/her math anxiety and spur quicker thinking (compensation of the emotional system).

2.4 A Brief Overview of the Affective Infusion Model (AIM)

2.4.1 An Explanation of AIM

The Affective Infusion Model (AIM) developed by Forgas (1995) is a dual process network theory of affect that can inform our understanding of how arousal, affective and cognitive processes work in conjunction. Overall, network theories of affect postulate that affective arousal spreads activation to cognitive systems that are linked to the emotion that is being aroused. Reciprocally, cognitive processes may also spread activation to affective systems, as this network of association is a bidirectional rather than unidirectional link (Forgas, 1999). Network theories assume that affect and cognition are linked in an associative network where some affective nodes are biologically hardwired, and can become more greatly elaborated by learning throughout the lifetime (Forgas, 1999). When one experiences an affective state, activation can spread to physiological, autonomic and cognitive systems, memories are accessed that are associated with that affect, and action tendencies that are in congruence with the affect-related information are initiated (Forgas, 1999).

The AIM expands upon network theories of affect by advocating the important role of decision-making style. According to AIM, decision-making style will have a great impact on the amount of affective influence in the outcome of a decision. More specifically, an individual's decision-making style determines the degree to which affect is infused into the individual's constructive processing. Once affect is infused into the decision-making process, learning, memory, attention and associative processes may all be coloured or primed in an affect-congruent direction.

Important to the current project, AIM seeks to explain mood-incongruent outcomes by illuminating how people can either directly accesses pre-existing opinions (use heuristics) or engage in targeted, motivated processing that is incompatible with affect infusion (process mediation). Moreover, people can use different processing strategies dependent upon factors such as task familiarity, complexity and typicality of the task, personal relevance, personal motivation, processing capacity, and mood effects (Forgas, 1999).

2.4.2 Four Processing Strategies

Forgas (1999) outlines four processing strategies (see Figure D-3), all of which may be relevant to outcomes in the face-in-the-crowd procedure.

The direct access strategy. The direct access strategy involves crystallized, predetermined reactions and evaluations when objects or situations do not need extensive processing. It is most likely to be used when the task is familiar, there is little or no personal involvement, and there are no other motivational, cognitive, affective or situational forces requiring elaborate processing. This process resists affect infusion. By extending AIM to the face-in-the-crowd procedure, it is postulated that the direct access strategy is most likely to be used when the participant is not anxious (no affective force or personal involvement requiring elaborate processing); using a rational thinking style (crystallized, predetermined strategies, not associated with affect); and the targets or crowds are neutral (object does not need extensive processing).

In terms of dual process design, the direct access strategy may be viewed as being a selective design as only one process is activated and it has sole control over behavioral output. Predetermined reactions result from a given stimulus and no extensive processing is necessitated. Therefore, no affect is infused as the affective system is not activated.

The motivated processing strategy. The motivated processing strategy involves processing that is guided by a strong, pre-existing objective, leaving little "unguided" and therefore less chance of affect infusion. It is most likely to be used when a specific outcome is desired, when highly motivated search and integration strategies are used, and when there are enduring personality characteristics that lead a person to approach the cognitive task in this manner. By extending AIM to the face-in-the-crowd procedure, it is postulated that the motivated processing strategy is most likely to be used when the participant is either anxious or nonanxious (but the motivated processing style will not allow the anxious affect to be infused); using a rational thinking style (enduring personality characteristic that leads a person to approach the cognitive task in this manner); and the targets or crowds are happy, angry, or neutral (all targets approached in the same motivated manner).

In terms of dual process design, the motivated processing strategy may be viewed as being a competitive design as both cognitive and affective processes are activated, but only cognitive processing has control over behavioral output as the individual is highly motivated to approach the task in a strictly cognitive manner. Therefore, little affect is infused as the two systems compete, but most often purely cognitive strategies are chosen.

The heuristic processing strategy. The heuristic processing strategy involves the computation of a response with the least amount of effort, relying on any mental short-cuts available. It is most likely to be used when the task is simple, personal relevance is low, cognitive capacity is limited, there is no strong motivational goal, reactions are being based on irrelevant associations with environmental variables (Forgas, 1999), or reactions are being informed by one's prevailing mood according to an affect-as-information model (Clore, Schwartz, & Conway, 1994; Forgas, 1999). By extending AIM to the face-in-the-crowd procedure, it is postulated that the heuristic processing strategy is most likely to be used when the participant is not anxious (personal relevance is low); using an experiential thinking style (not using a strategy, associated with affect and using affect-as-information); and the targets are neutral (task is simple and does not require extensive processing).

In terms of dual process design, the heuristic processing strategy may be viewed as being a consolidative design as both cognitive and affective processes may be activated, and both processes may have control over behavioral output. The individual may rely on cognitive short-cuts, or use affective-as-information, depending on the circumstances and the principle of least effort. Therefore, the degree of affect infused is variable.

The substantive processing strategy. The substantive processing strategy involves the most constructive information processing and has the greatest likelihood of affect infusion. During substantive processing, people select, learn, interpret and process information, and relate the information to pre-existing knowledge. It is most likely to be used when the task is complex, personally relevant, and when there is no specific motivational goal guiding them. By extending AIM to the face-in-the-crowd procedure, it is postulated that the substantive processing strategy is most likely to be used when the participants are anxious (personal relevance is high and there is the greatest chance of affect infusion); use an experiential thinking style (intimately associated with affect, greatest affect infusion); and (c) the targets are angry (the task is personally relevant and complex).

In terms of dual process design, the substantive processing strategy may be viewed as being a corrective design as *sometimes* both cognitive and affective processes are activated, and *sometimes* both processes have control over behavioral output. In substantive processing the output of one process may serve as the input for the other process to adjust for the optimum response. Therefore, the degree of affect infused may be the greatest as the two systems remain active and constructively adjust.

2.5 A Brief Overview of Cognitive-Experiential Self-Theory (CEST)

Cognitive-Experiential Self-Theory (CEST) developed by Epstein (1990) is a theory of personality encompassing two major conceptual systems, the rational and the experiential. According to CEST, individuals have an explicit, conscious theory of reality and an implicit, unconscious theory of reality that interact to produce behaviors that will cope with current environmental demands.

2.5.1 Two Processing Systems

Epstein (1992) outlines two systems (see Table B-1), which may be relevant to outcomes in the face-in-the-crowd procedure.

The rational system. The rational system is considered to be a conscious, relatively slow, analytical, and affect-free system of thinking that has a very brief evolutionary history (Pacini & Epstein, 1999). Rational thinking tends to be effortful, logical and reason-oriented and changes rapidly and easily, especially with the strength of an argument or new evidence (Epstein, 1998).

The experiential system. The experiential system is considered to be unconscious, relatively rapid, non-analytical, affect-laden, and has a longer evolutionary history (Pacini & Epstein, 1999). Experiential thinking tends to be effortless, pleasure-and-pain oriented and changes slowly with repetitive or intense experience (Epstein, 1998).

In terms of dual process design, CEST may be viewed as being a corrective design as *sometimes* both rational and experiential processes are activated, and *sometimes* both processes have control over behavioral output. Epstein (1998) explains that behavior is assumed to be the product of the joint operation of the two systems, and that the contributions of the two systems vary along a continuum form complete dominance by one system to complete dominance by the other. He also explains that both systems are influenced by individual differences in thinking style and situational variables. Important to the current research, Epstein postulates that if a task is particularly emotionally involving it tends to shift the relative influence of the two systems in the direction of increasing dominance of the experiential system.

2.6 Theoretical Significance of Two New Face-in-the-Crowd Studies

Both the AIM and CEST may provide beneficial theoretical guidance for future face-in-the-crowd studies. These models necessitate examining both affective and cognitive components as predictors of processing strategies and outcome measures that can help pinpoint their use. As such, the current two face-in-the-crowd studies attempted to assess participant affective and cognitive styles by predicting participant RTs and physiological arousal in the face-in-the-crowd task based on the theoretical assumptions of the AIM and CEST.

In keeping with the previous research of Byrne and Eysenck (1995) and Gilboa-Schechtman and colleagues (1999), affective processes were assessed on the basis of anxiety. Anxiety was measured by the STAI and participant self-report of anxious feelings during the task. Unique to the two current studies, cognitive processes were assessed on the basis of decision-making style. Decision-making style was measured by the Rational-Experiential Inventory (REI; Epstein, Pacini, & Norris, 1998). Outcome measures to help pinpoint affective arousal included both RT and GSR, and the outcome measure to help pinpoint cognitive involvement was RT.

Collectively, the two current face-in-the-crowd studies aimed to expand our understanding of previous face-in-the-crowd findings by examining the roles of both the affective component of state and trait anxiety and the decision-making style component of the rational and experiential systems in the speed of detection and physiological arousal of facial stimuli. More globally, it is hoped that the two current studies will provide support for network theories such as the AIM and CEST and will substantiate the use of dual process theories in future studies.

3. STUDY ONE: THE FACE-IN-THE-CROWD AND TARGET ANALYSES

3.1 Rationale

The purpose of Study One was to replicate previous target detection face-in-the-crowd findings (anger superiority effect at the level of automatic processing, such that angry faces orient attention quickly and automatically) with measures of participants' trait anxiety and rational and experiential thinking styles. The researchers aimed to determine whether cognitive decision-making styles interact with affective predisposition for both the speed of detecting target facial expressions and the degree of physiological arousal to target facial expressions as predicted by the AIM and CEST.

3.2 Hypotheses

3.2.1 Assumptions for Hypotheses

It is important to illuminate the basic assumptions upon which the hypotheses of the current study are based. These assumptions pertain to the nature of the dual processes involved in the face-in-the-crowd procedure, the measurability of individual differences, the relative difficulty of emotional versus non-emotional processing, and the principles of limited capacity and least effort.

The first assumption is that the dual processing involved in the face-in-the-crowd task is that of a relatively automatic, emotionally-based system versus a controlled, cognitively-based system. It is important not to conceptually confound automatic processing with non-conscious processing as automatic processing may be either pre-conscious or post-conscious dependent on whether conscious awareness of a stimulus is required to initiate the processing (Bargh, 1989).

The second assumption pertains to the interaction of these two systems. The following hypotheses are based on the assertion that automatic processes may be suppressed by controlled processes, but that this suppression will consume controlled processing resources (Bargh 1982, 1984, 1989; Bargh and Pratto, 1986), as well as the assertion that automatic processes may influence controlled processes by orienting (Posner, 1992; Roskos-Ewoldsen & Fazio, 1992), or restricting (Posner 1992), or amplifying (Kitayama, 1990, 1991) conscious attention.

The third assumption is that there are individual differences in the degree of utilization of the automatic, emotionally-based system versus the controlled, cognitively-based system, and that these individual differences can be predicted through the Rational-Experiential Inventory (Epstein, Pacini, & Norris, 1998). It is assumed that those individuals scoring highly on the Rational Scale will tend to favor the use of the controlled, cognitively-based system, and individuals scoring highly on the Experiential Scale will tend to favor the use of the automatic, emotionally-based system during the face-in-the-crowd procedure.

The fourth assumption is that emotional processing consumes more mental resources than non-emotional processing in general (Ewoldsen & Fazio, 1992), and that the processing of angry or threatening stimuli consumes more mental resources than the processing of happy or non-threatening stimuli (Pratto & John, 1991). It is assumed that a task requiring more mental resources and processing will take longer to execute than a task requiring less mental resources. As such, it is assumed that the experiential individuals utilizing an emotionally-based system of processing will have longer RTs than rational individuals utilizing a cognitively-based system of processing.

The fifth assumption is that individuals are limited in their capacity to process all stimuli to the fullest degree, and must categorize and discriminate between objects and events in order to reduce the complexity of the environment to manageable levels (Muskowitz, Skurnik, & Galinsky, 1999). Because cognitive capacity is limited and bounded, an individual must pick and choose what to attend to so that experience will not become chaotic and meaningless (Muskowitz, Skurnik, & Galinsky, 1999). A corollary of the principle of limited cognitive capacity is the principle of least effort. According to the principle of least effort, individuals do the minimum amount of processing necessary to achieve their goals (Eagly & Chaiken, 1993; Fiske & Taylor, 1984; Gilbert & Hixon, 1991).

3.2.2 Eight Hypotheses for Study One

There are eight hypotheses for Study One. These hypotheses are indicative of (1) the replication of the anger superiority effect in target detection; (2) the role of affect (High Trait Anxious and Low Trait Anxious groups according to the STAI, and High State Anxious and Low State Anxious groups according to the SAQ - question three) in target detection; (3) the role of decision-making style (Rational and Experiential groups) in target detection; (4) the combined role of affect and decision-making style in target detection; (5) the role of target type (angry or happy) in physiological arousal; (6) the role of affect (High Trait Anxious and Low Trait Anxious, and High State Anxious and Low State Anxious groups) in physiological arousal to targets; (7) the role of decision-making style in physiological arousal to targets; and (8) the combined role of affect and decision-making style in physiological arousal to targets.

Target detection hypothesis one. The first hypothesis is that there will be a significant main effect of Target on RT such that participants will have significantly faster RTs in the detection of angry targets versus happy targets in an array of neutral faces.

This hypothesis is based on the previous anger superiority effect in target detection findings of Eastwood and colleagues (2001); Fox and colleagues (1993); Gilboa-Schechtman and colleagues (1999); and Oehman and colleagues (2001) and the evolutionary theoretical assumption that the ability to detect faces should be maximized when the facial emotion conveys a potential threat (Fridlund, 1994, Hansen & Hansen, 1988; Schwartz et al., 1985).

Target detection hypothesis two. The second hypothesis is that there will be a significant interaction between Anxiety x Target on RT such that participants in the High Trait Anxious group versus the Low Trait Anxious group will have faster RTs for the detection of angry targets, but the two groups will not differ in their RTs for the detection of happy targets while maintaining the overall anger superiority effect in target detection. Consistent with the Byrne and Eysenck (1995) study, it is predicted that these affective results will be observed for the High Trait Anxious versus Low Trait Anxious groups according to the Trait Scale of the STAI. However, this effect will not hold for High State Anxious versus Low State Anxious groups according to SAQ - question three.

This hypothesis examines the affective component of the anger superiority effect, and the theoretical assumption of the AIM that anxious individuals may use affect-as-information. It is somewhat different than the findings of Byrne and Eysenck (1995) and Gilboa-Schectman and colleagues (1999), however. Although Byrne and Eysenck (1995) demonstrated that participants in the High Anxiety group versus the Low Anxiety group had faster RTs for the detection of angry targets and the two groups did not differ in their RTs for the detection of happy targets, they did not maintain the overall anger superiority effect in target detection (see Figure D-1). Although Gilboa-Schectman and colleagues (1999) did maintain the overall anger superiority effect in target detection, they demonstrated that participants in the High Anxiety group and Low Anxiety group had similar RTs for the detection of angry targets, but the High Anxiety group was slower in their detection of happy targets than the Low Anxiety group (see Figure D-2).

Target detection hypothesis three. The third hypothesis is that there will be a significant main effect of Decision-Making Style on RT such that participants in the Rational group versus the Experiential group will have faster RTs averaged over both target conditions.

Unique to this study, this hypothesis examines the cognitive component of target detection and is based on the theoretical assumption of the AIM and CEST that rational individuals will be more likely to employ a direct access or motivated processing style and execute a relatively faster search that is not slowed by affective processing, whereas experiential individuals will be more likely to employ heuristic or substantive processing style and execute a relatively slower search that is more time-consuming due to greater affective processing.

Target detection hypothesis four. The fourth hypothesis is that there will be a significant simple effect of Anxiety x Decision-Making Style on RT for angry targets such that participants in the High Trait Anxious/Rational group versus the Low Trait Anxious/Experiential group will have faster RTs in the detection of angry targets. Post hoc analysis will demonstrate that participants in the High Trait Anxious/Rational group versus the High Trait Anxious/Experiential group will have faster RTs in the detection of angry targets; and participants in the Low Trait Anxious/Rational versus the Low Trait Anxious/Experiential group will have faster RTs in the detection of angry targets. As extrapolated from the Byrne and Eysenck (1995) study, it is predicted that these results will be evidenced for the High Trait Anxious versus Low Trait Anxious groups according to the Trait Scale of the STAI, however, this effect will not hold for High State Anxious versus Low State Anxious groups according to SAQ - question three.

Unique to this study, this hypothesis examines the interaction of the affective and cognitive components of the anger superiority effect and target detection, and is based on the theoretical assumptions of the AIM and CEST.

Target detection hypothesis five. The fifth hypothesis is that there will be a significant main effect of Target on GSR such that angry targets versus happy targets will have greater GSR.

Unique to this study, this hypothesis is based on the Jamesian and physiological theory that the experience of emotions has accompanying autonomic nervous system arousal, and the evolutionary theoretical assumption that signals of threat have greater accompanying autonomic nervous system arousal than non-threatening signals so as to prepare the body for fight or flight.

Target detection hypothesis six. The sixth hypothesis is that there will be a significant interaction effect of Anxiety x Target on GSR such that participants in the High Trait Anxious group versus the Low Trait Anxious group will have greater GSR when presented with angry targets, but the two groups will not differ in their GSR to happy targets. It is further predicted that these results will be evidenced for both the High Trait Anxious versus Low Trait Anxious groups according to the Trait Scale of the STAI, and the High State Anxious versus Low State Anxious groups according to SAQ - question three.

This hypothesis is based on the Jamesian and physiological theory that the experience of emotions has accompanying autonomic nervous system arousal, and that anxious individuals experience a greater degree of autonomic arousal to threatening stimuli than their non-anxious counterparts.

Target detection hypothesis seven. The seventh hypothesis is that there will be a significant interaction effect of Decision-Making Style on GSR such that participants in the Experiential group versus the Rational group will have higher GSR when presented with angry targets, but the two groups will not differ in their GSR when presented with happy targets.

Unique to this study, this hypothesis examines the cognitive component of physiological arousal during target detection and is based on the theoretical assumption of the AIM and CEST that rational individuals will be more likely to employ a direct access or motivated processing style and execute a search that is free of affective processing, whereas experiential individuals will be more likely to employ heuristic or substantive processing style and execute a search that is influenced by affective processing.

Target detection hypothesis eight. The eighth hypothesis is that there will be a significant simple effect of Anxiety x Decision-Making Style on GSR for angry targets such that participants in the High Trait Anxious/Experiential group versus the Low Trait Anxious/Rational group will have higher GSR. Post hoc analysis will demonstrate that participants in the High Trait Anxious/Experiential group versus the High Trait Anxious/Rational group will have higher GSR when presented with angry targets; and participants in the Low Trait Anxious/Experiential versus the Low Trait Anxious/Rational group will have higher GSR when presented with angry targets. It is further predicted that these results will be evidenced for both the High Trait Anxious versus Low Trait Anxious groups according to the Trait Scale of the STAI, and the High State Anxious versus Low State Anxious groups according to SAQ - question three.

Unique to this study, this hypothesis examines the interaction of the affective and cognitive components of the anger superiority effect and physiological arousal during target detection, and is based on the theoretical assumptions of the AIM and CEST.

3.3 Method

3.3.1 Participants

Participants consisted of 190 psychology undergraduate students. Fifty-eight participants were male, 106 participants were female, and 26 participants did not indicate their sex on the demographic questionnaire. The vast majority of participants were between the ages of 17 and 30, with only seven participants indicating an age above 30. Participants were grouped on the basis of their STAI trait score, Centre for Epidemiologic Studies Depression Scale (CES-D; Radloff, 1977) score, and their Rational and Experiential Scores of the REI (see Design and Procedure for the specifics of the groupings). Participants had normal or corrected-to-normal vision. There were no other exclusionary criteria for this study. Participants were given course credit for their participation.

3.3.2 Materials

The State-Trait Anxiety Inventory. The STAI (Spielberger, 1983) is a 40 item self-report inventory that contains 20 questions assessing one's level of anxiety *right now* (state anxiety) and 20 questions assessing one's level of anxiety *generally* (trait anxiety). Each question is rated on a four-point Likert scale from 0 (*almost never*) to 3 (*almost always*). An example of a statement is: "*I feel nervous and restless*." Byrne and Eysenck (1995) found that while trait anxiety had a significant effect on participant responses in face-in-the-crowd studies, state anxiety did not have a significant effect, even when state anxiety was being manipulated.

The STAI Trait Scale is a reliable instrument. The test-retest correlations for trait anxiety for college students ranged from .73 (retesting after 104 days in males) to .86 (retesting after 20 days in males) with a median reliability coefficient of .76 (Spielberger, 1983). Internal consistency as evidenced by Cronbach's alpha coefficients for trait anxiety was uniformly high with a median coefficient of .90 (Spielberger, 1983).

The Center for Epidemiologic Studies Depression Scale (CES-D). The CES-D (Radloff, 1977) is a self-report questionnaire consisting of 20 statements pertaining to the affective, somatic and interpersonal symptoms of depression. Participants respond to each statement based on the way they have been feeling in the past week. Items are scored on a Likert scale from 1 (*Rarely or None of the Time: Less than 1 Day)* to 4 (*Most or All of the Time: 5-7 Days*). An example of a statement is: "*I had crying spells.*"

The CES-D is a reliable instrument. The average of three to twelve week test-retest correlations for the CES-D was .54 in a sample of 607 participants from the general population who reported having no major life events in the interim period (Radloff, 1977). Internal consistency as evidenced by Cronbach's alpha coefficients for overall depression score in the general population was .85 (Radloff, 1977).

The Rational-Experiential Inventory. The REI (Epstein, Pacini, & Norris, 1998) is a 40 item self-report inventory that contains 20 questions assessing one's level of rational thinking, and 20 questions assessing one's level of experiential or intuitive thinking rated on a Likert scale from 1 (*definitely false*) to 5 (*definitely true*). The Rational Scale was created from the Need For Cognition Scale (NFC; Cacioppo & Petty, 1982) and assesses a system of thinking that is conscious, relatively slow, analytical, relatively affect-free, and has a very brief evolutionary history (Pacini & Epstein, 1999). An example of a statement on the Rational Scale is: "*I generally don't depend on my feelings to help me make decisions*." The Experiential Scale was created from the Faith in Intuition Scale (FI) and assesses a system of thinking that is preconscious, rapid, automatic, holistic, intimately associated with affect, and has a very long evolutionary history (Pacini & Epstein, 1999). An example of a statement on the Experiential Scale is: "*I trust my initial feelings about people*." Both the Rational and Experiential Scales are negatively correlated with anxiety and depression. The Rational Scale and Experiential Scale will be examined both separately and in conjunction with one another.

The REI is a reliable instrument. Pacini and Epstein (1999) report internal consistency as evidenced by Cronbach's alpha coefficients for the Rational Scale at .90 and for the Experiential Scale at .87 in an undergraduate sample. Factor analysis confirms that rationality and experientiality are independent and orthogonal factors.

Demographic questionnaire. Demographic information requested included: name, gender, age, phone number (to contact participants to schedule a second session of testing).

Search Strategy and Anxiety Questionnaire (SAQ). The SAQ is a four item self-report questionnaire. The first three items are forced choice and the fourth item is open-ended. The questions were as follows:

1. In completing the two experiments, were you more concerned about: (a) speed or (b) accuracy?
2. Did you use a search strategy that was more indicative of: (a) searching as quickly as possible in a specific pattern, such as by columns or rows or swirling out from the centre, etc. or (b) scanning as quickly as possible in no particular pattern and going with your gut feelings?
3. Did you feel anxious during the task: (a) yes or (b) no?
4. Please write any additional comments you have about your search strategy, or the experimental task in general, in space provided.

Facial stimuli. The facial stimuli consisted of black and white displays of photographs of the same female face in three emotional conditions (angry, happy, neutral). These photographs were taken from the Ekman pictures of facial affect (Ekman & Friesen, 1975) and were the same photographs used by Gilboa-Schechtman and colleagues (1999; see Figure D-4; see Figure D-5).

The gray-scale of these pictures was controlled to eliminate any dark versus light confound and an area of neck on both the happy and neutral faces was blackened with PhotoShop Pro in order to better match their angry counterpart.

Computer. A PC computer (P-III 450, 17" Sony colour monitor) displayed the matrices, and recorded response times and accuracy using E-Prime computer software (version 1.0, Psychology Software Tools).

Skin conductance equipment. Skin conductance equipment used for this research includes the Biopac MP100 data acquisition and analysis system, the GSR100C GSR amplifier, a set of TSD203 Ag-AgCl unpolarized finger electrodes and electrode gel and the STP100C Isolated Digital Interface for coordination of GSR measurements to stimuli presented with E-Prime. AcqKnowledge software measured and recorded minimum, maximum, mean, median and standard deviation of skin conductance for each trial.

3.3.3 Outcome Measures

Reaction time was measured as an indicator of cognitive, affective, and physiological engagement in the face-in-the-crowd task. Reaction time has been the most studied outcome measure for the ability to find facial threat in a crowd. Reaction time can inform generally about the speed of detection, and can help to illuminate whether a participant was performing a parallel (relatively automatic) or serial (relatively controlled) search. However, RT cannot inform as to whether the underlying processes were affective or cognitive in nature. For this reason, RT was correlated with predictive measures in these three areas.

Galvanic skin response was measured as an indicator of physiological arousal. GSR peaks approximately four to five seconds after stimulus presentation, with the magnitude of the peak in skin response indicative of the degree of physiological arousal (Bradley & Lang, 2001). In some circumstances, GSR is a more useful measure of arousal than heart rate, as electrodermal activity is equally reactive to both positively and negatively valenced stimuli, and is more robust against effects of posture, respiratory anomalies, and individual physical differences such as body weight and fitness (Bradley & Lang, 2001). To date, no face-in-the-crowd researchers have endeavored to record GSR as a measure of physiological arousal during the task.

3.3.4 Design and Procedure

Participants completed the demographic questionnaire, STAI Trait Scale, CES-D and the REI by either filling out the paper-and-pencil inventories in a classroom setting, or completing the questionnaires online. Participants were then invited to take part in the two face-in-the-crowd studies (outlined below) in a laboratory setting.

The order of presentation for the target detection (Study One) and crowd search (Study Two) face-in-the-crowd tasks was counterbalanced among participants. Participant identification numbers were assigned randomly, and those participants with even identification numbers completed the procedure for Study One first, and those participants with odd identification numbers completed Study Two first. When both Study One and Study Two were completed, participants were given the SAQ. It is estimated that on average, this self-report questionnaire took less than 2 minutes to complete and the laboratory session took less than 30 minutes in total.

Participants provided informed consent prior to completing the inventories and prior to participating in the two face-in-the-crowd studies, and were debriefed and thanked following completion of the inventories and completion of the two face-in-the-crowd studies. All procedures were approved by the University of Saskatchewan Research Ethics board.

Selection of High Trait Anxious and Low Trait Anxious groups. Participants completed the STAI (trait) questionnaire (either paper-and-pencil form or online). Scores on the STAI Trait Scale were examined, and participants were selected into a High Trait Anxious group and Low Trait Anxious group based upon a median split. As such, 76 participants (33 male, 43 female) were selected into the High Trait Anxious group (mean Trait Scale score = 48.83, SD = 5.87), and 88 participants (25 male, 63 female) were selected into the Low Trait Anxious group (mean Trait Scale score = 32.44, SD = 5.39). For analyses involving this variable, 26 participants were omitted because their score was at the median and they did not fit into either the High Trait Anxious or Low Trait Anxious groups.

The trait scores of the two groups appear to correlate well with the college-age standardization sample provided in the STAI manual, as the mean score of our High Trait Anxious group placed them at the 81st percentile of the standardization sample, and the mean score of our Low Trait Anxious group placed them at the 25th percentile of the standardization sample.

As anxiety and depression are highly correlated (typically about +.60 or +.70) and there are empirical grounds for including anxious, but not depressed participants in this study (e.g. Byrne & Eysenck, 1995), participants also completed the CES-D and any main effects, interaction effects or covariance of depression with anxiety were assessed.

Selection of High State Anxious and Low State Anxious groups. Participants completed the Search Strategy and Anxiety Questionnaire immediately after completing the face-in-the-crowd target detection and crowd search studies. Based on their answer to SAQ – question three: *Did you feel anxious during the task: (a) yes or (b) no?*, participants were selected into a High State Anxious group and a Low State Anxious group. As such, 74 participants (36 male, 63 female, 11 did not indicate sex) were selected into the High State Anxious, and 111 participants (36 male, 63 female, 12 did not indicate sex) were selected into the Low State Anxious group. For analyses involving this variable, 5 participants were omitted because they did not answer SAQ – question three.

Selection of Rational and Experiential groups. Participants completed the REI questionnaire by either filling out the paper-and-pencil form or completing an online administration through the University of Saskatchewan's Psychology Participant Pool website. Scores on the Rational and Experiential Scales of the REI were examined, and as the Rational and Experiential Scales are orthogonal, and there are theoretical grounds to keep the Rational and Experiential groups from overlapping, the Rational group was comprised of those participants scoring in the top half of the rational scores and the bottom half of experiential scores, and the Experiential group comprised those participants scoring in the top half of experiential scores and the bottom half of rational scores. As such, 40 participants (21 male, 19 female) were selected into the Rational group (mean Rational Scale score = 83.15, SD = 5.77, mean Experiential Scale score = 61.43, SD = 6.42), and 35 participants (9 male, 26 female) were selected into the Experiential group (mean Experiential Scale score = 79.03, SD = 7.43, mean Rational Scale score = 65.60, SD = 7.58). For analyses involving this variable, 115 participants were omitted because they did not fit into either the Rational or Experiential groups.

The face-in-the-crowd procedure for Study One. Participants completed the face-in-the-crowd procedure while RT, accuracy, and GSR were being measured. Participants entered the lab, GSR equipment was attached, and the participant rested for five minutes while the GSR electrode gel had a chance to reach maximum efficiency and the E-Prime Clock Test was run to calibrate the millisecond timing of RT data. Participants were asked to keep as still as possible throughout the experiment so as not to interfere with GSR readings. After five minutes, and in congruence with the Gilboa-Schechtman and colleagues (1999) study, participants were instructed:

> "In this task, you will see twelve faces on the screen. At times, all the twelve faces are going to be identical. At other times, one of the faces will be emotionally different from the rest. Your task is to make a judgment about the presence or absence of a different (or discrepant) emotional face among those twelve faces as *quickly* and as *accurately* as you possibly can by pressing either the SAME (all the faces are identical) or the DIFFERENT (one of the faces is emotionally discrepant) key on the computer keyboard. Please press the spacebar to begin."

Each trial consisted of a crowd of neutral faces arranged in a three rows by four columns matrix in such a manner that the total surface area of the array was 5½ inches in height x 6 inches in length. In 25% of the trials there was one angry target; 25% of the trials contained one happy target; and 50% of the trials contained no target. Each target appeared three times each in one of the twelve positions of the matrix at random. Thus, there were a total of 144 trials (72 nontarget trials, 36 angry target trials, 36 happy target trials).

Participants indicated their decision of absence or presence of a target by pressing either the button marked SAME or DIFFERENT. Once the participant made a response, the display was terminated. Following a six second interval, the next trial began. A six second interval ensured that peak GSR was recorded for each trial. Random presentation of the images was controlled by the E-Prime computer software, and responses and RTs were recorded by the E-Prime computer software. AcqKnowledge software for the skin conductance response equipment recorded skin conductance data for each trial throughout the entire session. The experimenter remained in the room throughout the task.

3.4 Analyses

Target detection analyses were carried out using a 2 (Anxiety = high, low) x 2 (Decision-Making Style = rational, experiential) x 2 (Target = angry, happy) repeated measures ANOVA. Anxiety and Decision-Making Style were between subjects variables; Target type was a within subjects variable; RT was the dependent variable for the first set of analyses and GSR was the dependent variable for the second set of analyses.

Following significant omnibus ANOVAs, separate univariate analyses and tests of simple effects helped to clarify the nature of the relations among the independent variables and dependent variables for all the significant main effects and interaction effects.

As in the Gilboa-Schechtman and colleagues (1999) study, trials involving extreme RTs (i.e., RTs shorter than 333 msec or longer than two standard deviations above the participant's mean RT per target type) were eliminated from further analyses. Overall, excluded responses constituted 3.6 percent of the trials, and their number did not significantly differ as a function of target type, crowd type or group. Decision latencies were computed separately for each group, each target type, and each crowd type. The means and standard deviations for these latencies and GSR readings are presented in Tables B-2 through B-14.

Preliminary analyses were conducted with sex and with depression score on the CESD as between subjects factors. No main effects or interactions involving gender or depression score were detected in these analyses, and therefore these factors were omitted from the final analyses.

3.5 Results

3.5.1 Participants

Individuals scoring less than chance (less than 50% on overall proportion correct or less than 50% on hits versus false alarms) were eliminated from further analyses. Excluded participants constituted five percent of the total number of participants and did not significantly differ as a function of group.

3.5.2 Target Detection Hypothesis One

The first hypothesis was that there would be a significant main effect of Target on RT such that participants (n = 165) would have significantly faster RTs in the detection of angry targets versus happy targets.

There are two ways to examine this question. The first is to analyze participant RTs to angry versus happy targets in a neutral crowd. The second way to examine this question is to analyze participant RTs to angry targets in a happy crowd versus its converse condition, happy targets in an angry crowd.

Angry versus happy targets in neutral crowds. As predicted, participants had significantly faster RTs in the detection of angry targets (mean = 1850.253 msec, SD = 482.087) versus happy targets (mean = 1892.990 msec, SD = 541.256) in an array of neutral faces, [$F(1, 164) = 3.996$, $P < .05$].

Angry targets in happy crowds versus happy targets in angry crowds. As predicted, participants had significantly faster RTs in the detection of angry targets in happy crowds (mean = 2164.141 msec, SD = 504.269) versus happy targets in angry crowds (mean = 2292.159 msec, SD = 594.418), [$F(1, 164) = 14.732$, $P < .001$].

3.5.3 Target Detection Hypothesis Two

The second hypothesis was that there would be a significant interaction between trait anxiety and target on RT, such that participants in the High Trait Anxious group (n = 63) versus the Low Trait Anxious group (n = 76) would have faster RTs for the detection of angry targets, but the two groups would not differ in their RTs for the detection of happy targets, while maintaining the overall anger superiority effect in target detection. It was further predicted that these effects would not be evidenced for the High State Anxious group (n = 66) versus the Low State Anxious group (n = 96).

There are two ways to examine this question. The first is to analyze High Trait Anxious and Low Trait Anxious group RTs to angry versus happy targets in a neutral crowd. The second is to analyze High Trait Anxious and Low Trait Anxious group RTs to angry targets in a happy crowd versus its converse condition, happy targets in an angry crowd.

Trait Anxiety and angry versus happy targets in neutral crowds. In this instance there was a significant interaction effect of Anxiety x Target on RT, [$F(1, 137) = 3.926$, $P < .05$]. Simple effects analyses for the STAI Trait Scale median split demonstrates that the High Trait Anxious group had faster RTs for the detection of angry targets (mean = 1904.339 msec, SD = 538.718) versus happy targets (mean = 1991.227msec, SD = 683.223), [$F(1, 62) = 5.531$, $P <.05$], whereas the Low Trait Anxious group showed no significant difference in their RTs between target types, [$F(1, 75) = .040$, $P = .842$] (see Figure D-6).

State Anxiety and angry versus happy targets in neutral crowds. In this instance there was a significant between subjects effect of Anxiety on RT for High State Anxious versus Low State Anxious participants based on self-reported anxiety during the procedure (SAQ - question three). In this case, the self-reported High State Anxious participants had significantly faster RTs (mean = 1759.887 msec, SD = 410.938) versus Low State Anxious participants (mean = 1952.444 msec, SD = 565.687) averaged over both target conditions, [$F(1, 160) = 6.029$, $P < .05$] (see Figure D-7).

Trait Anxiety and angry targets in happy crowds versus happy targets in angry crowds. In this instance, there was no significant interaction effect of Anxiety x Target on RT, [$F(1, 137) = .048$, $P = .828$].

State Anxiety and angry targets in happy crowds versus happy targets in angry crowds. In this instance, there was a significant between subjects effect of Anxiety on RT for High State Anxious versus Low State Anxious participants based on self-reported anxiety during the procedure (SAQ, question three). Once again, the High State Anxious participants had significantly faster RTs (mean = 2132.638 msec, SD = 509.498) versus Low State Anxious participants (mean = 2294.733 msec, SD = 574.570) averaged over both target conditions, [$F(1, 160) = 4.001$, $P < .05$] (see Figure D-8).

3.5.4 Target Detection Hypothesis Three

The third hypothesis was that there would be a significant between subjects effect of Decision-Making Style on RT such that participants in the Rational group (n = 37) versus the Experiential group (n = 32) would have faster RTs averaged over both target conditions.

There are two ways to examine this question. The first is to analyze High Rational/Low Experiential (Rational) and High Experiential/Low Rational (Experiential) group RTs to angry versus happy targets in a neutral crowd. The second is to analyze Rational and Experiential group RTs to angry targets in a happy crowd versus its converse condition, happy targets in an angry crowd.

Decision-Making Style and angry versus happy targets in neutral crowds. In this instance, a between subjects effect of Decision-Making Style on RT almost reached significance, and could be considered a trend, [$F(1, 67) = 3.256$, $P = .076$]. Rational participants tended to have faster RTs (mean = 1828.941 msec, SD = 436.099) versus Experiential participants (mean = 2056.941

msec, SD = 637.614) averaged over both target conditions (see Figure D-9), although this did not reach significance.

Simple effects analyses for Decision-Making Style median split demonstrated that the Rational group had faster RTs for the detection of happy targets in neutral crowds (mean = 1801.512 msec, SD = 431.305) than the Experiential group (mean = 2070.916 msec, SD = 661.103), [$F(1, 67) = 4.121$, $P < .05$], whereas the Rational and Experiential groups showed no significant difference in their RTs for the detection of angry targets in neutral crowds, [$F(1, 67) = 2.142$, $P = .148$] (see Figure D-9).

Decision-Making Style and angry targets in happy crowds versus happy targets in angry crowds. In this instance, there was a significant between subjects effect of Decision-Making Style on RT. Overall, Rational participants had faster RTs (mean = 2140.274 msec, SD = 470.073) versus Experiential participants (mean = 2419.940 msec, SD = 603.820) averaged over both target conditions, [$F(1, 67) = 5.462$, $P < .05$] (see Figure D-10).

Simple effects analyses demonstrated that the Rational group had faster RTs for the detection of happy targets in angry crowds (mean = 2147.107 msec, SD = 475.771) than Experiential participants (mean = 2493.044 msec, SD = 607.629) [$F(1, 67) = 7.022$, $P = .01$], whereas the Rational and Experiential groups showed no significant difference in their RTs for the detection of angry targets in happy crowds, [$F(1, 67) = 2.767$, $P = .101$] (see Figure D-10).

3.5.5 Target Detection Hypothesis Four

The fourth hypothesis concerned the combined role of affect and decision-making style in target detection, and was comprised of three questions.

The first question of the hypothesis postulated that there would be a significant simple effect of Anxiety x Decision-Making Style on RT for angry targets such that participants in the High

Trait Anxious/Rational (HTAR) group (n = 12) versus the Low Trait Anxious/Experiential (LTAE) group (n = 16) would have faster RTs in the detection of angry targets.

The second question of the hypothesis postulated that there would be a significant simple effect of Anxiety x Decision-Making Style on RT for angry targets such that participants in the High Trait Anxious/Rational (HTAR) group versus the High Trait Anxious/Experiential (HTAE) group (n = 16) would have faster RTs in the detection of angry targets.

The third question of the hypothesis postulated that there would be a significant simple effect of Anxiety x Decision-Making Style on RT for angry targets such that participants in the Low Trait Anxious/Rational (LTAR) group (n = 25) versus the Low Trait Anxious/Experiential (LTAE) group (n = 16) would have faster RTs in the detection of angry targets.

There are two ways to examine each of these three questions. The first is to analyze group RTs to angry targets in a neutral crowd. The second is to analyze group RTs to angry targets in a happy crowd. As extrapolated from the Byrne and Eysenck (1995) study, it is predicted that these results will be evidenced for trait anxiety according to the Trait Scale of the STAI, but these effects would not be evidenced for the High State Anxious/Rational (HSAR) group (n = 16), High State Anxious/Experiential (HSAE) group (n = 9), Low State Anxious/Rational (LSAR) group (n = 21), or Low State Anxious/Experiential (LSAE) group (n = 23).

HTAR versus LTAE: Trait Anxiety x Decision-Making Style for angry targets in neutral crowds. In this instance, there was no significant simple effect of Anxiety x Decision-Making Style on RT, [$F(1, 26) = .995$, $P = .328$] (see Figure D-11).

HSAR versus LSAE: State Anxiety x Decision-Making Style for angry targets in neutral crowds. In this instance, there was no significant simple effect of Anxiety x Decision-Making Style on RT, [$F(1, 37) = 3.184$, $P = .083$] for angry targets in neutral crowds (see Figure D-12).

However, pairwise comparisons of means for the omnibus ANOVA for angry versus happy targets in neutral crowds indicated a significant overall difference in RTs for HSAR versus LSAE ($P < .05$). Overall, HSAR participants had faster RTs (mean = 1740.311 msec, SD = 385.073) versus LSAE participants (mean = 2105.537 msec, SD = 699.723) averaged over both target conditions (see Figure D-12).

HTAR versus LTAE: Trait Anxiety x Decision-Making Style and angry targets in happy crowds. In this case, there was no significant simple effect of Anxiety x Decision-Making Style on RT, [$F(1, 26) = .726$, $P = .402$] (see Figure D-13).

HSAR versus LSAE: State Anxiety x Decision-Making Style and angry targets in happy crowds. In this case, there was no significant simple effect of Anxiety x Decision-Making Style on RT, [$F(1, 37) = 1.307$, $P = .260$] (see Figure D-14). However, pairwise comparisons of means for the omnibus ANOVA for angry targets in happy crowds versus happy targets in angry crowds indicated a significant overall difference in RTs for HSAR versus LSAE ($P < .05$). Overall, HSAR participants had faster RTs (mean = 2147.261 msec, SD = 480.972) versus LSAE participants (mean = 2484.608 msec, SD = 632.579) averaged over both target conditions (see Figure D-14).

HTAR versus HTAE: Trait Anxiety x Decision-Making Style and angry targets in neutral crowds. In this case, there was no significant simple effect of Anxiety x Decision-Making Style on RT, [$F(1, 26) = 1.807$, $P = .191$] (see Figure D-11).

HSAR versus HSAE: State Anxiety x Decision-Making Style and angry targets in neutral crowds. In this case, there was no significant simple effect of Anxiety x Decision-Making Style on RT, [$F(1, 22) = 2.090$, $P = .162$] (see Figure D-12).

HTAR versus HTAE: Trait Anxiety x Decision-Making Style and angry targets in happy crowds. In this case, there was no significant simple effect of Anxiety x Decision-making Style on RT, [$F(1, 26) = 1.312$, $P = .262$] (see Figure D-13).

HSAR versus HSAE: State Anxiety x Decision-Making Style and angry targets in happy crowds. In this case, there was no significant simple effect of Anxiety x Decision-making Style on RT, [$F(1, 22) = .470$, $P = .500$] (see Figure D-14).

LTAR versus LTAE: Trait Anxiety x Decision-Making Style and angry targets in neutral crowds. In this case, there was no significant simple effect of Anxiety x Decision-Making Style on RT, [$F(1, 39) = 0.374$, $P = .544$] (see Figure D-11).

LSAR versus LSAE: State Anxiety x Decision-Making Style and angry targets in neutral crowds. In this case, there was no significant simple effect of Anxiety x Decision-Making Style on RT, [$F(1, 42) = 0.799$, $P = .376$] (see Figure D-12).

LTAR versus LTAE: Trait Anxiety x Decision-Making Style and angry targets in happy crowds. In this case, there was no significant simple effect of Anxiety x Decision-Making Style on RT, [$F(1, 39) = 1.265$, $P = .268$] (see Figure D-13).

LSAR versus LSAE: State Anxiety x Decision-Making Style and angry targets in happy crowds. In this case, there was no significant simple effect of Anxiety x Decision-Making Style on RT, [$F(1, 42) = 2.475$, $P = .123$] (see Figure D-14). However, pairwise comparisons of means for the omnibus ANOVA for angry targets in happy crowds versus happy targets in angry crowds indicated a significant overall difference in RTs for LSAR versus LSAE ($P < .05$). Overall, LSAR participants had faster RTs (mean = 2134.951 msec, SD = 471.243) versus LSAE participants (mean = 2484.608 msec, SD = 632.579) averaged over both target conditions (see Figure D-14).

3.5.6 Target Detection Hypothesis Five

The fifth hypothesis was that there would be a significant main effect of Target on GSR such that angry targets versus happy targets would have greater GSR. In this instance, there was no significant main effect of Target on GSR, [$F(1, 153) = .894$, $P = .346$] (n = 154).

3.5.7 Target Detection Hypothesis Six

The sixth hypothesis was that there would be a significant interaction effect of Anxiety x Target on GSR such that participants in the High Trait Anxious group (n = 69) versus the Low Trait Anxious group (n = 71) would have greater GSR when presented with angry targets, but the two groups would not differ in their GSR to happy targets. It was further predicted that these results would be evidenced for both trait anxiety, according to the Trait Scale of the STAI, and would also be evidenced for the High State Anxious group (n = 60) versus the Low State Anxious group (n = 94).

Trait Anxiety and GSR. In this instance, the there was no significant interaction effect of Anxiety x Target on GSR, [$F(1, 138) = .278$, $P = .599$]. However, there was a significant between subjects effect of Trait Anxiety on GSR. Overall, the High Trait Anxious group had higher GSR (mean = 4.732 uhmo, SD = 2.700) versus the Low Trait Anxious group (mean = 3.844 uhmo, SD = 2.590) averaged over both target conditions, [$F(1, 138) = 3.961$, $P < .05$].

State Anxiety and GSR. In this instance, there is no significant interaction effect of Anxiety x Target on GSR, [$F(1, 152) = .841$, $P = .361$].

3.5.8 Target Detection Hypothesis Seven

The seventh hypothesis was that there would be a significant interaction effect of Decision-Making Style on GSR such that participants in the Experiential group (n = 31) versus the

Rational group (n = 27) would have higher GSR when presented with angry targets, but the two groups would not differ in their GSR when presented with happy targets.

In this instance, there was a significant interaction effect of Decision-Making Style on GSR [$F(1, 56) = 4.199$, $P < .05$]. Simple effects analyses demonstrated that the Rational group had higher GSR when presented with happy targets (mean = 3.696 uhmo, SD = 2.569) than when presented with angry targets (mean = 3.522 uhmo, SD = 2.461) [$F(1, 26) = 5.927$, $P < .05$], whereas the Experiential group showed no significant difference in their GSR when presented with angry versus happy targets, [$F(1, 30) = .059$, $P = .809$] (see Figure D-15).

3.5.9 Target Detection Hypothesis Eight

The eighth hypothesis concerned the combined role of affect and decision-making style on GSR for target detection, and was comprised of three questions.

The first question of the hypothesis postulated that there would be a significant simple effect of Anxiety x Decision-Making Style on GSR such that participants in the High Trait Anxious/Experiential (HTAE) group (n = 16) versus the Low Trait Anxious/Rational (LTAR) group (n = 17) would have higher GSR when presented with angry targets. The second question of the hypothesis postulated that there would be a significant simple effect of Anxiety x Decision-Making Style on GSR such that participants in the High Trait Anxious/Experiential (HTAE) group versus the High Trait Anxious/Rational (HTAR) group (n = 10) would have higher GSR when presented with angry targets.

The third question of the hypothesis postulated that there would be a significant simple effect of Anxiety x Decision-making style on GSR such that participants in the Low Trait Anxious/Experiential (LTAE) group (n = 15) versus the Low Trait Anxious/Rational (LTAR) group would have higher GSR when presented with angry targets.

It was further predicted that these results would be evidenced for both trait anxiety, according to the Trait Scale of the STAI, and that these effects would also be evidenced for the High State Anxious/Experiential (HSAE) group (n = 9), Low State Anxious/Rational (LSAR) group (n = 17), High State Anxious/Rational (HSAR) group (n = 10), and Low State Anxious Experiential (LSAE) group (n = 22).

HTAE versus LTAR: Trait Anxiety x Decision-Making Style. In this instance, there was no significant simple effect of Trait Anxiety x Decision-making style on GSR, [$F(1, 31) = 2.069$, $P = .160$] (see Figure D-16).

HSAE versus LSAR: State Anxiety x Decision-Making Style. In this instance, there was no significant simple effect of State Anxiety x Decision-making style on GSR, [$F(1, 23) = .067$, $P = .798$] (see Figure D-17).

HTAE versus HTAR: Trait Anxiety x Decision-Making Style. In this instance, there was no significant simple effect of Trait Anxiety x Decision-making style on GSR, [$F(1, 24) = .222$, $P = .642$] (see Figure D-16).

HSAE versus HSAR: State Anxiety x Decision-Making Style. In this instance, there was no significant simple effect of State Anxiety x Decision-making style on GSR, [$F(1, 16) = .554$, $P = .467$] (see Figure D-17).

LTAE versus LTAR: Trait Anxiety x Decision-Making Style. In this instance, there was no significant simple effect of Trait Anxiety x Decision-making style on GSR, [$F(1, 30) = .901$, $P = .350$]. However, there was a significant interaction effect between these two groups, [$F(1, 30) = 5.996$, $P < .05$]. Simple effects analyses demonstrated that the LTAR group had significantly higher GSR when presented with happy targets (mean = 3.563 uhmo, SD = 2.007) than when presented with angry targets (mean = 3.331 uhmo, SD = 1.949), whereas the LTAE group showed no significant difference in their GSR when presented with angry versus happy targets, [$F(1, 14) = 1.125$, $P = .307$] (see Figure D-16).

LSAE versus LSAR: State Anxiety x Decision-Making Style. In this instance, there was no significant simple effect of State Anxiety x Decision-making style on GSR, [$F(1, 37) = 1.250$, $P = .271$]. However, there was a significant interaction effect between these two groups, [$F(1, 37) = 4.712$, $P < .05$]. Simple effects analyses demonstrated that the LSAR group had significantly higher GSR when presented with happy targets (mean = 3.489 uhmo, SD = 2.616) than when presented with angry targets (mean = 3.257 uhmo, SD = 2.454), whereas the LSAE group showed no significant difference in their GSR when presented with angry versus happy targets, [$F(1, 21) = .080$, $P = .780$]] (see Figure D-17).

3.5.9 Discussion

The purpose of Study One was to replicate previous target detection face-in-the-crowd findings (anger superiority effect at the level of automatic processing, such that angry faces orient attention quickly and automatically) with measures of participants' trait anxiety and rational and experiential thinking styles.

Overall, the anger superiority effect was replicated in that participants had faster RTs for the detection of angry target faces over happy target faces in a neutral crowd. Also replicated were the findings of Gilboa-Schechtman and colleagues (1999), such that a significant Group x Target interaction emerged. Participants in the High Trait Anxious group detected angry targets faster than the Low Trait Anxious group; however, the two groups did not differ on their speed at finding happy targets.

Unique to this study, significant differences were also found between the Rational and Experiential groups such that the Rational group tended to have faster RTs overall. No significant results were found to show that cognitive decision-making styles interact with trait anxiety for the speed of detecting target facial expressions.

Also unique to this study, participants' degree of physiological arousal to target facial expressions was examined. Results indicate that, overall, the High Trait Anxious group had higher GSR than the Low Trait Anxious group. And, curiously, the Rational group displayed significantly higher GSR to happy targets than angry targets.

On the whole, Study One successfully replicated previous findings in terms of the anger superiority effect in target detection, and successfully replicated previous findings in terms of significant Anxiety x Target interactions. The first study also successfully demonstrated the usefulness of cognitive decision-making style as a variable in future face-in-the-crowd studies

4. STUDY TWO: THE FACE-IN-THE-CROWD AND CROWD SEARCH ANALYSES

4.1 Rationale

The purpose of Study Two is to replicate previous crowd search face-in-the-crowd findings (anger inferiority effect at the level of controlled processing, such that angry faces require a longer time to process) with measures of participants' trait anxiety and rational and experiential thinking styles. The researchers aimed to determine whether cognitive decision-making styles interact with affective predisposition for both the speed of crowd searches and the degree of physiological arousal to crowd facial expressions as predicted by the AIM and CEST.

4.2 Hypotheses

4.2.1 Assumptions for Hypotheses

The assumptions for the hypotheses of Study Two are the same as the assumptions for hypotheses of Study One.

4.2.2 Eight Hypotheses for Study Two

There are eight hypotheses for Study Two. These hypotheses are indicative of (1) the replication of the anger inferiority effect in crowd search; (2) the role of affect (High Trait Anxious and Low Trait Anxious groups according to the STAI, and High State Anxious and Low State Anxious groups according to the SAQ - question three) in crowd search; (3) the role of decision-making style (rational or experiential) in crowd search; (4) the combined role of affect and decision-making style in crowd search; (5) the role of crowd type (angry or happy) in physiological arousal; and (6) the role of affect (High Trait Anxious and Low Trait Anxious, and High State Anxious and Low State Anxious groups) in physiological arousal to crowds; (7) the role of decision-making style in physiological arousal to crowds; and (8) the combined role of affect and decision-making style in physiological arousal to crowds

Crowd search hypothesis one. The first hypothesis is that there will be a significant main effect of Crowd on RT such that participants will have longer RTs when there is a crowd of angry faces versus a crowd of happy faces.

This hypothesis is based on the previous anger inferiority effect in the crowd analyses of Hansen and Hansen (1994) and the evolutionary theoretical assumption that full and proper processing has survival value when a facial emotion conveys a potential threat (Fridlund, 1994, Hansen & Hansen, 1988; Schwartz et al., 1985).

Crowd search hypothesis two. The second hypothesis is that there will be a significant interaction effect of Anxiety x Crowd on RT such that participants in the High Trait Anxious group versus Low Trait Anxious group will have slower RTs for angry crowd searches, but the two groups will not differ in their RTs for happy crowd searches. As extrapolated from the Byrne and Eysenck (1995) study, it is further predicted that these results will be evidenced for the High Trait Anxious versus Low Trait Anxious groups according to the Trait Scale of the STAI, however, this effect will not hold for the High State Anxious versus Low State Anxious groups according to SAQ - question three.

This hypothesis examines the affective component of the previous anger inferiority effect in the crowd analyses of Byrne and Eysenck (1995) and Gilboa-Schechtman and colleagues (1999), and the theoretical assumption of Hansen and Hansen (1994) that angry faces maintain the focus of attention making it more difficult for participants to look away, and the AIM postulation that anxious individuals may use affect-as-information.

Crowd search hypothesis three. The third hypothesis is that there will be a significant main effect of Decision-Making Style on RT such that participants in the Rational group versus the Experiential group will have faster RTs averaged over both crowd conditions.

Unique to this study, this hypothesis examines the cognitive component of crowd distraction in the face-in-the-crowd paradigm, and is based on the theoretical assumption of the AIM and CEST that rational individuals will be more likely to employ a direct access or motivated processing style and execute a relatively faster search that is not slowed by affective processing, whereas experiential individuals will be more likely to employ a heuristic or substantive processing style and execute a relatively slower search that is more time-consuming due to greater affective processing.

Crowd search hypothesis four. The fourth hypothesis is that there will be a significant simple effect of Anxiety x Decision-Making Style on RT for angry crowd searches such that participants in the High Trait Anxious/Experiential group versus the Low Trait Anxious/Rational group will have longer RTs in angry crowd searches. Post hoc analysis will demonstrate that participants in the High Trait Anxious/Experiential group versus the High Trait Anxious/Rational group will have slower RTs in angry crowd searches; and participants in the Low Trait Anxious/Experiential versus the Low Trait Anxious/Rational will have slower RTs in angry crowd searches.

As extrapolated from the Byrne and Eysenck (1995) study, it is predicted that these results will be evidenced for the High Trait Anxious versus Low Trait Anxious groups according to the Trait Scale of the STAI, however, this effect will not hold for High State Anxious versus Low State Anxious groups according to SAQ - question

Unique to this study, this hypothesis examines the interaction of the affective and cognitive components of crowd distraction in the face-in-the-crowd effect, and is based on the theoretical assumptions of the AIM and CEST.

Crowd search hypothesis five. The fifth hypothesis is that there will be a significant main effect of Crowd on GSR such that angry crowds versus happy crowds will have greater GSR.

Unique to this study, this hypothesis is based on the Jamesian and physiological theory that the experience of emotions has accompanying autonomic nervous system arousal, and the evolutionary theoretical assumption that signals of threat have greater accompanying autonomic nervous system arousal than non-threatening signals so as to prepare the body for fight or flight.

Crowd search hypothesis six. The sixth hypothesis is that there will be a significant interaction effect of Anxiety x Crowd on GSR such that participants in the High Trait Anxious group versus the Low Trait Anxious group will have greater GSR when presented with angry crowds, but the two groups will not differ in their GSR to happy crowds. It is further predicted that these results will be evidenced for both the High Trait Anxious versus Low Trait Anxious groups according to the Trait Scale of the STAI, and the High State Anxious versus Low State Anxious groups according to SAQ - question three.

This hypothesis is based on the Jamesian and physiological theory that the experience of emotions has accompanying autonomic nervous system arousal, and that anxious individuals experience a greater degree of autonomic arousal to threatening stimuli than their non-anxious counterparts.

Crowd search hypothesis seven. The seventh hypothesis is that there will be a significant interaction effect of Decision-Making Style on GSR such that participants in the Experiential group versus the Rational group will have higher GSR when presented with angry crowds, but the two groups will not differ in their GSR when presented with happy crowds.

Unique to this study, this hypothesis examines the cognitive component of physiological arousal during crowd searches and is based on the theoretical assumption of the AIM and CEST that rational individuals will be more likely to employ a direct access or motivated processing style and execute a search that is free of affective processing, whereas experiential individuals will be more likely to employ heuristic or substantive processing style and execute a search that is influenced by affective processing.

Crowd search hypothesis eight. The eighth hypothesis is that there will be a significant simple effect of Anxiety x Decision-Making Style on GSR for angry crowd searches such that participants in the High Trait Anxious/Experiential group versus the Low Trait Anxious/Rational group will have higher GSR. Post hoc analysis will demonstrate that participants in the High Trait Anxious/Experiential group versus the High Trait Anxious/Rational group will have higher GSR when presented with angry crowds; and participants in the Low Trait Anxious/Experiential versus the Low Trait Anxious/Rational group will have higher GSR when presented with angry crowds. It is further predicted that these results will be evidenced for both the High Trait Anxious versus Low Trait Anxious groups according to the Trait Scale of the STAI, and the High State Anxious versus Low State Anxious groups according to SAQ - question three.

Unique to this study, this hypothesis examines the interaction of the affective and cognitive components of the anger inferiority effect and physiological arousal during crowd searches, and is based on the theoretical assumptions of the AIM and CEST.

4.3 Method

4.3.1 Participants

The same participants from Study One took part in Study Two. To reduce the possibility of attrition, the session for Study Two took place either immediately before or immediately after Study One.

4.3.2 Materials

The materials were the same materials from Study One with the exception that the AcqKnowledge software for the GSR readings was set to measure and record minimum, maximum, mean and standard deviation of skin conductance for each block of the three blocks of the session as opposed to each trial. The change from recording GSR per trial to recording GSR per block was because it is the GSR to the crowd and not the target that will be analyzed.

4.3.3 Outcome Measures

Reaction time was measured as an indicator of both cognitive and affective engagement and GSR was measured as an indicator of physiological arousal. Reaction time and GSR have been outlined in the outcome measures section of Study One.

4.3.4 Design and Procedure

The design and procedure was similar to the design and procedure for Study One with a few exceptions noted here:

The face-in-the-crowd procedure for Study Two. For Study Two, the face-in-the-crowd procedure consisted of three blocks of 48 trials. Each block consisted of a crowd of 12 faces in 3 rows x 4 columns, 5½ inches in height x 6 inches in length. Each crowd contained a predominant emotional expression: one block contained crowds of angry faces; one block contained crowds of happy faces; and one block contained crowds of neutral faces.

In each block, half of the trials were target trials and half of the trials were non-target trials. Specifically, in the angry crowd block, 25% of the trials contained one happy target, 25%

contained one neutral target and 50% contained no target (that is, all faces were angry). In the happy crowd block, 25% of the trials contained one angry target, 25% contained one neutral target and 50% contained no target (that is all faces were happy). In the neutral crowd block, 25% of the trials contained one happy target, 25% contained one angry target and 50% contained no target (that is all faces were neutral).

Each target appeared once in each of the twelve positions of the matrix (the position was random), making a total of 48 trials per block (24 non-target trials, 12 trials containing one target emotion, 12 trials with the alternate target emotion). Random presentation of the images and blocks was controlled by the E-Prime computer software, and responses and decision latencies were recorded by the E-Prime computer software.

The time interval between two successive trials was 500 msec. This interval was shorter than the six second interval required for target detection analyses (Study One) because mean GSR per block was being measured (as opposed to the peak GSR per trial being measured in target detection analyses), and 500 msec is the interval consistent with previous face-in-the-crowd studies. Participants had the opportunity to rest between blocks. The AcqKnowledge software for the GSR readings was set to measure and record minimum, maximum, mean and standard deviation of skin conductance for each block of the three blocks of the session as opposed to each trial.

4.4 Analyses

Crowd search analyses were carried out using a 2 (Anxiety = high, low) x 2 (Decision-Making Style = rational, experiential) x 2 (Crowd = angry, happy) repeated measures ANOVA. Anxiety and Decision-Making Style were between subjects variables; Crowd type was a within subjects variable; RT was the dependent variable for the first set of analyses and GSR was the dependent variable for the second set of analyses.

Following significant omnibus ANOVAs, separate univariate analyses and tests of simple effects helped to clarify the nature of the relations among the independent variables and dependent variables for all the significant main effects and interaction effects.

4.5 Results

4.5.1 Participants

Individuals scoring less than chance (less than 50% on overall proportion correct or less than 50% on hits versus false alarms) were eliminated from further analyses. Excluded participants constituted five percent of the total number of participants and did not significantly differ as a function of group.

4.5.2 Crowd Search Hypothesis One

The first hypothesis was that there would be a significant main effect of Crowd on RT such that participants (n = 165) would have longer RTs when there is a crowd of angry faces versus a crowd of happy faces.

There are three ways to examine this question. The first is to analyze participant RTs to neutral targets in angry versus happy crowds. The second is to analyze participant RTs to happy targets in angry crowds versus its converse condition, angry targets in happy crowds. The third is to analyze participant RTs to angry versus happy crowds in no target trials.

Neutral targets in angry versus happy crowds. In this instance, the hypothesis was not supported as participants did not differ significantly in their RTs to neutral target trials in angry versus happy crowd searches, [$F(1,164) = 1.109$, $P = .294$].

Happy targets in angry crowds versus angry targets in happy crowds. In this instance the hypothesis was supported. Overall, participants had significantly longer RTs in angry crowd searches (mean = 2292.159 msec, SD = 594.418) versus happy crowd searches (mean = 2164.141 msec, SD = 504.269) [$F(1, 164) = 14.732$, $P < .001$].

No target trials in angry versus happy crowds. In this instance the hypothesis was not supported as participants did not differ significantly in their RTs to no target trials in angry versus happy crowd searches, [$F(1,164) = 0.185$, $P = .668$].

4.5.3 Crowd Search Hypothesis Two

The second hypothesis was that there would be a significant interaction effect of Anxiety x Crowd on RT such that participants in the High Trait Anxious group (n = 63) versus Low Trait Anxious (n = 76) group would have slower RTs for angry crowd searches, but the two groups would not differ in their RTs for happy crowd searches. It was further predicted that these effects would not be evidenced for the High State Anxious group (n = 66) versus the Low State Anxious group (n = 96).

There are three ways to examine this question. The first is to analyze High Trait Anxious and Low Trait Anxious group RTs to neutral targets in angry versus happy crowds. The second is to analyze High Trait Anxious and Low Trait Anxious group RTs to happy targets in angry crowds versus its converse condition, angry targets in happy crowds. The third is to analyze High Trait Anxious and Low Trait Anxious group RTs to no target trials in angry versus happy crowds.

Trait Anxiety and neutral targets in angry versus happy crowds. In this instance there was no significant interaction effect of Anxiety x Crowd on RT, [$F(1,137) = .293$, $P = .589$].

State Anxiety and neutral targets in angry versus happy crowds. In this instance there was a significant interaction effect of Anxiety on RT for High State Anxious versus Low State Anxious participants based on self-reported anxiety during the procedure (SAQ - question three), [$F(1,160) = 7.702$, $P < .01$] (see Figure D-18).

Simple effects analyses for self-reported anxiety during the procedure demonstrated that the High State Anxious group had faster RTs for the detection of neutral targets in angry crowds (mean = 2078.108 msec, SD = 477.264) than Low State Anxious participants (mean = 2341.192 msec, SD = 703.445), [$F(1, 160) = 7.007$, $P < .01$], whereas the High State Anxious and Low State Anxious groups showed no significant difference in their RTs for the detection of neutral targets in happy crowds, [$F(1, 160) = .326$, $P = .569$] (see Figure D-18).

Simple effects analyses for self-reported anxiety during the procedure also demonstrated that the High State Anxious group had faster RTs for the detection of neutral targets in angry crowds (mean = 2078.108 msec, SD = 477.264) versus neutral targets in happy crowds (mean = 2244.150 msec, SD = 559.647), [$F(1, 65) = 13.142$, $P = .001$], whereas the Low State Anxious group showed no significant difference in their RTs for the detection of neutral targets in angry versus happy crowds, [$F(1, 95) = .753$, $P = .388$] (see Figure D-18).

Trait Anxiety and happy targets in angry crowds versus angry targets in happy crowds. In this instance, there was no significant interaction effect of Anxiety x Crowd on RT, [$F(1, 137) = .048$, $P = .828$].

State Anxiety and happy targets in angry crowds versus angry targets in happy crowds. In this instance, there was a significant between subjects effect of Anxiety on RT for High State Anxious versus Low State Anxious participants based on self-reported anxiety during the procedure (Search SAQ - question three). The self-reported High State Anxious participants had significantly faster RTs (mean = 2132.638 msec, SD = 509.498) versus Low State Anxious participants (mean = 2294.733 msec, SD = 574.570) averaged over both crowd conditions, [F(1, 160) = 4.001, $P < .05$] (see Figure D-8).

Trait Anxiety and no target trials in angry versus happy crowds. In this instance there was no significant interaction effect of Anxiety x Crowd on RT, [F(1,137) = 1.273, P = .261].

State Anxiety and no target trials in angry versus happy crowds. In this instance there was a significant between subjects effect of Anxiety x Crowd on RT for High State Anxious versus Low State Anxious participants based on self-reported anxiety during the procedure (SAQ – question three), [F(1, 160) = 6.191, P = .01]. In this case, the self-reported High State Anxious participants had significantly faster RTs (mean = 3028.685 msec, SD = 1028.273) versus Low State Anxious participants (mean = 3549.200 msec, SD = 1574.029) averaged over both crowd conditions (see Figure D-19).

4.5.4 Crowd Search Hypothesis Three

The third hypothesis was that there would be a significant between subjects effect of Decision-Making Style on RT such that participants in the Rational group (n = 37) versus the Experiential group (n = 32) would have faster RTs averaged over both crowd conditions.

There are three ways to examine this question. The first is to analyze Rational and Experiential group RTs to neutral targets in angry versus happy crowds. The second is to analyze Rational and Experiential group RTs to happy targets in angry crowds with its converse condition, angry targets in happy crowds. The third is to analyze Rational and Experiential group RTs to no target trials in angry versus happy crowds.

Decision-Making Style and neutral targets in angry versus happy crowds. In this instance, there may be a trend toward a significant between subjects effect of Decision-Making Style on

RT. Overall, Rational participants tended to have faster RTs (mean = 2187.210 msec, SD = 492.795) versus Experiential participants (mean = 2425.704 msec, SD = 644.023) averaged over both crowd conditions, [$F(1, 67) = 3.579$, $P = .063$]. (see Figure D-20).

Simple effects analyses demonstrated that the Rational group had faster RTs for the detection of neutral targets in angry crowds (mean = 2133.388 msec, SD = 471.150) than Experiential participants (mean = 2480.779 msec, SD = 769.385), [$F(1, 67) = 5.267$, $P < .05$], whereas the Rational and Experiential groups showed no significant difference in their RTs for the detection of neutral targets in happy crowds, [$F(1, 67) = 1.081$, $P = .302$] (see Figure D-20).

Decision-Making Style and happy targets in angry crowds versus angry targets in happy crowds. In this instance, there was a significant between subjects effect of Decision-Making Style on RT. Overall, Rational participants had faster RTs (mean = 2140.274 msec, SD = 470.073) versus Experiential participants (mean = 2419.940 msec, SD = 603.820) averaged over both target conditions, [$F(1, 67) = 5.462$, $P < .05$] (see Figure D-10).

Simple effects analyses demonstrated that the Rational group had faster RTs for the detection of happy targets in angry crowds (mean = 2147.107 msec, SD = 475.771) than Experiential participants (mean = 2493.044 msec, SD = 607.629) [$F(1, 67) = 7.022$, $P = .01$], whereas the Rational and Experiential groups showed no significant difference in their RTs for the detection of angry targets in happy crowds, [$F(1, 67) = 2.767$, $P = .101$] (see Figure D-10).

Decision-Making Style and no target trials in angry versus happy crowds. In this instance, there may be a trend toward a significant between subjects effect of Decision-Making Style on RT. Overall, Rational participants tended to have faster RTs (mean = 3193.843 msec, SD = 1104.512) versus Experiential participants (mean = 3733.326 msec, SD = 1459.981) averaged over both crowd conditions, [$F(1, 67) = 3.363$, $P = .071$] (see Figure D-21).

There was a significant interaction effect of Decision-Making Style on RT, [$F(1, 67) = 9.291$, $P < .01$]. Simple effects analyses demonstrated that the Rational group had faster RTs for no target trials in angry crowds (mean = 2998.438 msec, SD = 898.619) than Experiential participants (mean = 3857.865 msec, SD = 1602.670), [$F(1, 67) = 7.812$, $P < .01$], whereas the Rational and Experiential groups showed no significant difference in their RTs for no target trials in happy crowds, [$F(1, 67) = .479$, $P = .491$] (see Figure D-21).

Simple effects analyses also demonstrated that the Rational group had faster RTs for the no target trials in angry crowds (mean = 2998.438 msec, SD = 898.619) versus no target trials in happy crowds (mean = 3389.249 msec, SD = 1310.405), [$F(1, 36) = 8.664$, $P < .01$], whereas the Experiential group showed no significant difference in their RTs for no target trials in angry versus happy crowds, [$F(1, 31) = 2.264$, $P = .143$] (see Figure D-21).

4.5.5 Crowd Search Hypothesis Four

The fourth hypothesis concerned the combined role of affect and decision-making style in crowd searches, and was comprised of three questions.

The first question of the hypothesis postulated that there would be a significant simple effect of Anxiety x Decision-Making Style on RT for angry crowd searches such that participants in the High Trait Anxious/Experiential (HTAE) group (n = 16) versus the Low Trait Anxious/Rational (LTAR) group (n = 25) would have longer RTs in angry crowd searches.

The second question of the hypothesis postulated that there would be a significant simple effect of Anxiety x Decision-Making Style on RT such that participants in the High Trait Anxious/Experiential (HTAE) group versus the High Trait Anxious/Rational (HTAR) group (n = 12) would have longer RTs in angry crowd searches.

The third question of the hypothesis postulated that there would be a significant simple effect of Anxiety x Decision-Making Style on RT such that participants in the Low Trait Anxious/Experiential (LTAE) group (n = 16) versus the Low Trait Anxious/Rational (LTAR) would have longer RTs in angry crowd searches.

It was further predicted that these effects would not be evidenced for the High State Anxious/Experiential (HSAE) group (n = 9), Low State Anxious/Rational (LSAR) group (n = 21), High State Anxious/Rational (HSAR) group (n = 16), or Low State Anxious/Experiential (LSAE) group (n = 23).

There are three ways to examine these three questions. The first is to analyze group RTs to neutral targets in angry crowds. The second is to analyze group RTs to happy targets in angry crowds. The third is to analyze group RTs to no target trials in angry versus happy crowds.

HTAE versus LTAR: Trait Anxiety x Decision-Making Style for neutral targets in angry crowds. In this instance, there was no simple effect of Anxiety x Decision-Making Style on RT for neutral targets in angry crowds, [$F(1, 39) = 2.430$, $P = .127$] (see Figure D-22).

HSAE versus LSAR: State Anxiety x Decision-Making Style for neutral targets in angry crowds. In this instance, there was no simple effect of Anxiety x Decision-Making Style on RT for neutral targets in angry crowds, [$F(1, 26) = .119$, $P = .733$] (see Figure D-23).

HTAE versus LTAR: Trait Anxiety x Decision-Making Style for happy targets in angry crowds. In this instance, there was no simple effect of Anxiety x Decision-Making Style on RT for happy targets in angry crowds, [$F(1, 39) = 2.984$, $P = .092$] (see Figure D-13).

HSAE versus LSAR: State Anxiety x Decision-Making Style for happy targets in angry crowds. In this instance, there was no simple effect of Anxiety x Decision-Making Style on RT for happy targets in angry crowds, [$F(1, 26) = .289$, $P = .595$] (see Figure D-14).

HTAE versus LTAR: Trait Anxiety x Decision-Making Style for no target trials in angry crowds. There was a simple effect of Anxiety x Decision-Making Style on RT for no target trials in angry crowds. Overall, the HTAE group had longer RTs to no target angry crowd searches (mean = 3958.023 msec, SD = 1916.652) versus the LTAR group (mean = 3027.245 msec, SD = 927.278), [$F(1, 39) = 4.352$, $P = < .05$] (see Figure D-24).

HSAE versus LSAR: State Anxiety x Decision-Making Style for no target trials in angry crowds. In this instance, there was no simple effect of Anxiety x Decision-Making Style on RT for no target trials in angry crowds, [$F(1, 26) = .396$, $P = .535$] (see Figure D-25).

HTAE versus HTAR: Trait Anxiety x Decision-Making Style for neutral targets in angry crowds. There was no simple effect of Anxiety x Decision-Making Style on RT for neutral targets in angry crowds, [$F(1, 26) = 1.719$, $P = .201$] (see Figure D-22).

HSAE versus HSAR: State Anxiety x Decision-Making Style for neutral targets in angry crowds. There was no simple effect of Anxiety x Decision-Making Style on RT for neutral targets in angry crowds, [$F(1, 22) = 2.056$, $P = .166$] (see Figure D-23).

HTAE versus HTAR: Trait Anxiety x Decision-Making Style for happy targets in angry crowds. There may be a trend toward a simple effect of Anxiety x Decision-Making Style on RT for happy targets in angry crowds. Overall, the HTAE group tended to have longer RTs to happy targets in angry crowds (mean = 2486.203 msec, SD = 625.430) versus the HTAR group (mean = 2072.937 msec, SD = 444.580), [$F(1, 26) = 3.786$, $P = .063$] (see Figure D-13).

HSAE versus HSAR: State Anxiety x Decision-Making Style for happy targets in angry crowds. There was no simple effect of Anxiety x Decision-Making Style on RT for happy targets in angry crowds, [$F(1, 22) = .421$, $P = .523$] (see Figure D-14).

HTAE versus HTAR: Trait Anxiety x Decision-Making Style for no target trials in angry crowds. There was no simple effect of Anxiety x Decision-Making Style on RT for no target trials in angry crowds, [$F(1, 26) = 2.920$, $P = .099$] (see Figure D-24).

HSAE versus HSAR: State Anxiety x Decision-Making Style for no target trials in angry crowds. There was no simple effect of Anxiety x Decision-Making Style on RT for no target trials in angry crowds, [$F(1, 22) = 2.241$, $P = .149$] (see Figure D-25).

LTAE versus LTAR: Trait Anxiety x Decision-Making Style for neutral targets in angry crowds. There may be a trend toward a simple effect of Anxiety x Decision-Making Style on RT for neutral targets in angry crowds. Overall, LTAE participants tended to have longer RTs to neutral targets in angry crowds (mean = 2457.724 msec, SD = 526.692) versus LTAR participants (mean = 2145.308 msec, SD = 497.986), [$F(1, 39) = 3.672$, $P = .063$] (see Figure D-22).

LSAE versus LSAR: State Anxiety x Decision-Making Style for neutral targets in angry crowds. There was no simple effect of Anxiety x Decision-Making Style on RT for neutral targets in angry crowds, [$F(1, 42) = 2.780$, $P = .103$] (see Figure D-23).

LTAE versus LTAR: Trait Anxiety x Decision-Making Style for happy targets in angry crowds. There may be a trend toward a simple effect of Anxiety x Decision-Making Style on RT for happy targets in angry crowds. Overall, the LTAE group tended to have longer RTs to happy targets in angry crowds (mean = 2499.885 msec, SD = 609.735) versus the LTAR group (mean = 2182.709 msec, SD = 494.849), [$F(1, 39) = 3.342$, $P = .075$] (see Figure D-13).

LSAE versus LSAR: State Anxiety x Decision-Making Style for happy targets in angry crowds. There was a significant simple effect of Anxiety x Decision-Making Style on RT for happy targets in angry crowds. Overall, the LSAE group had longer RTs to happy targets in angry crowds (mean = 2593.993 msec, SD = 639.128) versus the LSAR group (mean = 2160.315 msec, SD = 469.243), [$F(1, 42) = 6.476$, $P < .05$] (see Figure D-14).

Also, pairwise comparisons of means for the omnibus ANOVA for angry targets in happy crowds versus happy targets in angry crowds indicated a significant overall difference in RTs for LSAE versus LSAR ($P < .05$). Overall, the LSAE group had longer RTs (mean = 2484.608 msec, SD = 632.579) versus the LSAR group (mean = 2134.951 msec, SD = 472.452) averaged over both crowd conditions (see Figure D-14).

LTAE versus LTAR: Trait Anxiety x Decision-Making Style for no target trials in angry crowds. There was a simple effect of Anxiety x Decision-Making Style on RT for no target trials in angry crowds. Overall, the LTAE group had longer RTs to angry crowd searches (mean = 3757.708 msec, SD = 1270.268) versus the LTAR group, (mean = 3027.245 msec, SD = 927.278), [$F(1, 39) = 4.528$, $P < .05$] (see Figure D-24).

LSAE versus LSAR: State Anxiety x Decision-Making Style for no target trials in angry crowds. There was a simple effect of Anxiety x Decision-Making Style on RT for no target trials in angry crowds. Overall, the LSAE group had longer RTs to angry crowd searches (mean = 4043.697 msec, SD = 1702.241) versus the LSAR group, (mean = 3112.541 msec, SD = 941.792), [$F(1, 42) = 4.906$, $P < .05$] (see Figure D-25).

4.5.6 Crowd Search Hypothesis Five

The fifth hypothesis wais that there would be a significant main effect of Crowd on GSR such that angry crowds versus happy crowds would have greater GSR. In this case, there was no significant main effect of Crowd on GSR, [$F(1, 130) = .009$, $P = .925$] (n = 131).

4.5.7 Crowd Search Hypothesis Six

The sixth hypothesis was that there would be a significant interaction effect of Anxiety x Crowd on GSR such that participants in the High Trait Anxious group (n = 53) versus the Low Trait Anxious group (n = 63) would have greater GSR when presented with angry crowds, but the two groups will not differ in their GSR to happy crowds. It was further predicted that these results would also be evidenced for the High State Anxiety group (n = 50) versus the Low State Anxiety group (n = 81).

Trait Anxiety and GSR. In this instance, there was a significant interaction effect of Anxiety x Crowd on GSR, [$F(1, 114) = 6.986$, $P < .01$]. Simple effects analyses for the STAI median split demonstrates that the High Trait Anxious group had a trend toward higher GSR during angry crowd searches (mean = 4.300 uhmo, SD = 2.842) versus happy crowd searches (mean = 4.023 uhmo, SD = 2.692), [$F(1, 52) = 3.800$, $P < .057$], whereas the Low Trait Anxious group did not differ in their GSR for happy versus angry crowd searches, [$F(1, 62) = 3.139$, $P = .081$], (see Figure D-26).

State Anxiety and GSR. In this instance, there was no significant interaction effect of Anxiety x Crowd on GSR, [$F(1, 129) = .001$, $P = .979$].

4.5.8 Crowd Search Hypothesis Seven

The seventh hypothesis was that there would be a significant interaction effect of Decision-Making Style on GSR such that participants in the Experiential group (n = 29) versus the Rational group (n = 24) would have higher GSR when presented with angry crowds, but the two groups would not differ in their GSR when presented with happy crowds.

In this instance, there was no significant interaction effect of Decision-Making Style on GSR [$F(1, 51) = .003$, $P < .957$].

4.5.9 Crowd Search Hypothesis Eight

The eighth hypothesis concerned the combined role of affect and decision-making style on GSR for crowd searches, and was comprised of three questions.

The first question of the hypothesis postulated that there would be a significant simple effect of Anxiety x Decision-Making Style on GSR such that participants in the High Trait Anxious/Experiential (HTAE) group (n = 14) versus the Low Trait Anxious/Rational (LTAR) group (n = 15) would have higher GSR when presented with angry crowds.

The second question of the hypothesis postulated that there would be a significant simple effect of Anxiety x Decision-Making Style on GSR such that participants in the High Trait Anxious/Experiential (HTAE) group versus the High Trait Anxious/Rational (HTAR) group (n = 9) would have higher GSR when presented with angry crowds.

The third question of the hypothesis postulated that there would be a significant simple effect of Anxiety x Decision-making style on GSR such that participants in the Low Trait Anxious/Experiential (LTAE) group (n = 15) versus the Low Trait Anxious/Rational (LTAR) group would have higher GSR when presented with angry crowds.

It was further predicted that these results would also be evidenced for the High State Anxious/Experiential (HSAE) group (n = 7), Low State Anxious/Rational (LSAR) group (n = 14), High State Anxious/Rational (HSAR) group (n = 10), or Low State Anxious/Experiential (LSAE) group (n = 22).

HTAE versus LTAR: Trait Anxiety x Decision-Making Style. In this instance, there was a significant simple effect of Trait Anxiety x Decision-making style on GSR, [$F(1, 27) = 5.919$, $P < .05$], such that the HTAE group had higher GSR when presented with angry crowds (mean = 4.615 uhmo, SD = 1.923) versus the LTAR group (mean = 2.825 uhmo, SD = 2.032). The two groups did not differ in their GSR when presented with happy crowds, [$F(1, 27) = 1.877$, $P = .182$] (see Figure D-27).

Simple effects analysis for these two groups also demonstrated that the HTAE showed significantly higher GSR to angry crowds (mean = 4.615 uhmo, SD = 1.923) versus happy crowds (mean = 3.722 uhmo, SD = 1.835), [$F(1, 13) = 10.089$, $P < .01$], whereas the HTAR showed no significant difference in their GSR to angry versus happy crowds, [$F(1, 14) = .103$, $P = .753$] (see Figure D-27).

HSAE versus LSAR: State Anxiety x Decision-Making Style. In this instance, there was a significant simple effect of State Anxiety x Decision-making style on GSR, [$F(1, 17) = 11.403$, $P < .01$], such that the HSAE had higher GSR when presented with angry crowds (mean = 4.800 uhmo, SD = 2.689) versus the LSAR group (mean = 2.120 uhmo, SD = 0.808). The two groups also differed in their GSR when presented with happy crowds, [$F(1, 17) = 8.077$, $P < .05$] such that the HSAE group had higher GSR (mean = 4.472 uhmo, SD = 2.97122), than their LSAR counterparts (mean = 1.9861 uhmo, SD = .968) (see Figure D-28).

HTAE versus HTAR: Trait Anxiety x Decision-Making Style. In this instance, there was no significant simple effect of Trait Anxiety x Decision-making style on GSR, [$F(1, 21) = .715$, $P = .407$].

Simple effects analysis for these two groups demonstrated that the HTAE showed significantly higher GSR to angry crowds (mean = 4.615 uhmo, SD = 1.923) versus happy crowds (mean = 3.722 uhmo, SD = 1.835), [$F(1, 13) = 10.089$, $P < .01$], whereas the HTAR showed no significant difference in their GSR to angry versus happy crowds, [$F(1, 8) = 2.247$, $P = .172$] (see Figure D-27).

HSAE versus HSAR: State Anxiety x Decision-Making Style. In this instance, there was no significant simple effect of State Anxiety x Decision-making style on GSR, [$F(1, 14) = .161$, $P = .695$].

LTAE versus LTAR: Trait Anxiety x Decision-Making Style. In this instance, there was no significant simple effect of Trait Anxiety x Decision-making style on GSR, [$F(1, 28) = .1.081$, $P = .307$].

LSAE versus LSAR: State Anxiety x Decision-Making Style. In this instance, there was a significant simple effect of State Anxiety x Decision-making style on GSR, [$F(1, 34) = 6.437$, $P < .05$], such that the LSAE group had higher GSR when presented with angry crowds (mean = 4.047 uhmo, SD = 2.754) versus the LSAR group (mean = 2.1203 uhmo, SD = .808). The two groups also differed in their GSR when presented with happy crowds, [$F(1, 34) = 4.798$, $P < .05$] such that the LSAE group had higher GSR (mean = 3.817 uhmo, SD = 3.015), than their LSAR counterparts (mean = 1.986 uhmo, SD = .968) (see Figure D-28).

4.6 Discussion

The purpose of Study Two was to replicate previous crowd search face-in-the-crowd findings (anger inferiority effect at the level of controlled processing, such that angry faces require a longer time to process) with measures of participants' trait anxiety and rational and experiential thinking styles.

Overall, the anger inferiority effect was replicated in that participants had slower RTs for the detection of a happy target in an angry crowd, versus the detection of an angry target in a happy crowd. No significant group differences or interactions were observed for the High Trait Anxious versus Low Trait Anxious groups in their speed of crowd searching.

Unique to this study, significant differences were also found between the Rational and Experiential groups such that the Rational group tended to have faster RTs overall in numerous analyses. Two important interactions were also found such that the Rational group had faster RTs for no target trials in angry crowds than the Experiential group, whereas the Rational and Experiential groups showed no significant difference in their RTs for no target trials in happy crowds. And, the Rational group had faster RTs for the no target trials in angry crowds versus no target trials in happy crowds, whereas the Experiential group showed no significant difference in their RTs for no target trials in angry versus happy crowds.

There were also significant results to suggest that cognitive decision-making styles may interact with trait anxiety for the speed of crowd searching. There was a simple effect of Anxiety x Decision-Making Style on RT for no target trials in angry crowds. Overall, the HTAE group had longer RTs to no target angry crowd searches versus the LTAR group, and the LTAE group had longer RTs to no target angry crowd searches versus the LTAR group.

Also unique to this study, participants' degree of physiological arousal to crowd searching was examined. Results indicate that there was a significant interaction effect such that the High Trait Anxious group had a trend toward higher GSR during angry crowd versus happy crowd searches, whereas the Low Trait Anxious group did not differ in their GSR for happy versus angry crowd searches.

There were also significant results to suggest that cognitive decision-making-styles may interact with trait anxiety for the degree of physiological arousal to crowd searching. The HTAE group had higher GSR when presented with angry crowds versus the LTAR group, whereas the two groups did not differ in their GSR when presented with happy crowds. Simple effects analysis also demonstrated that the HTAE group showed significantly higher GSR to angry versus happy crowds, whereas the HTAR group showed no significant difference in their GSR to angry versus happy crowds.

On the whole, Study Two successfully replicated previous findings in terms of the anger superiority effect in target detection. The second study also successfully demonstrated the usefulness of cognitive decision-making style as a variable in future face-in-the-crowd studies.

5. GENERAL DISCUSSION FOR STUDY ONE AND STUDY TWO

Previous face-in-the-crowd studies have demonstrated significant effects based on target type, crowd type and level of participant anxiety. To date, no researchers have endeavored to explore the importance of differential thinking-styles in combination with these effects, or measure accompanying GSR to the task. The present researchers aimed to replicate previous face-in-the-crowd research in terms of target, crowd, and anxiety effects, and then add incremental theoretical validity by examining the dual-processes of CEST and the AIM in relation to face-in-the-crowd outcomes.

Consistent with the hypotheses, the results of both Study One and Study Two provide support for the consideration of different decision-making styles and physiological arousal in facial search tasks. In particular, the results demonstrate across numerous analyses that individuals placed in a Rational thinking style group had faster RTs and lower GSR to face-in-the-crowd search tasks than individuals placed in an Experiential thinking style group. This difference in RTs between rational and experiential thinkers has theoretical implications for future research.

5.1 Replication of Previous Face-in-the-Crowd Findings

5.1.1 Target Detection Effects

In their seminal study, Hansen and Hansen (1988) were interested in finding the basic anger superiority effect in facial target processing. They hypothesized that facial threat detection is relatively automatic and faster than non-threatening facial detection, as it would instigate an orienting response that would have adaptive survival value. To test this theory, Hansen and Hansen (1988) and several subsequent researchers (Byrne & Eysenck, 1995; Eastwood et al. 2001; Fox et al., 1993; Gilboa-Schechtman et al., 1999; Hampton et al., 1989; Lundqvist et al., 1999; Oehman et al., 2001; Purcell et al., 1996; White 1995) have examined this question by comparing participant RTs for the detection of angry targets versus happy targets in neutral crowds, and by comparing the RTs for the detection of angry targets in happy crowds with its converse condition, happy targets in angry crowds. In the majority of these studies, findings indicated that angry targets were found faster than happy targets, connoting an anger superiority effect at the level of target detection.

It is unlikely that this anger superiority effect for target detection is due to parallel processing or a "pop-out" effect. Parallel search is a term attributed to finding a target equally quickly regardless of the number of distractors, whereas serially processing is a term attributed to finding a target more easily when there are fewer distractors present (Maljkovic & Nakayama, 1994). Previous face-in-the-crowd research has already demonstrated that with increased numbers of distractors, the angry target does become harder to find, and yet it is still found more quickly than the happy target (Northdurft, 1993; Stewart, Purcell & Skoc, 1993). It is more likely that there are automatic processes operating above the level of preattentive parallel processing, but below a level at which conscious awareness serves as input to a controlled search (Hansen & Hansen, 1994). In other words, there is an "automatic vigilance" for angry targets which is difficult for controlled and serial processing to suppress and this vigilance for threat may serve to attract and maintain attention.

Study One replicated these findings for both the faster detection of angry targets versus happy targets in neutral crowds, and faster detection of angry targets in happy crowds versus its reciprocal, happy faces in angry crowds. Through replication of this basic effect, further support is given for the robustness of the anger superiority effect at the level of target detection, and there can be greater confidence in the validity of any novel findings in the current research.

5.1.2 Crowd Search Effects

Hansen and Hansen (1994) reported that in addition to an anger superiority effect at the level of target detection, some researchers have determined an anger inferiority effect for threatening crowd searches. They postulated two reasons for this effect. Firstly, the slower RTs during angry crowd searches may be due to the distraction of threatening stimuli at an automatic level. The angry faces serve as a constant distraction that consumes controlled processing resources to suppress, and this subsequently leads to longer search times. In other words, the anger superiority effect of target processing may bring about the anger inferiority effect during angry crowd searches. Or, alternatively, angry faces may simply be more difficult to process. Hansen and Hansen (1994) proposed that angry faces may more difficult to process because they are more confusable with other expressions, such as fear or sadness, whereas happy faces are more singular and distinct. They also hypothesized that angry expressions may be more difficult to process because they are not encountered or processed as frequently as happy expressions and therefore processing is less habitual and automatic.

Whatever the underlying process behind the anger inferiority effect of angry crowd searches, the research results have been varied and inconsistent. Researchers Hampton and colleagues (1989) found the effect in their Experiments 1 and 3, but not 2; Stewart and colleagues (1993) found the effect in their Experiment 2, but not 3: and Gilboa-Schechtman and colleagues (1999) found the effect in 1 out of 6 of their analyses.

In Study Two, the researchers sought to examine the anger inferiority effect of angry crowd searches in three ways: (1) by examining RTs for the detection of neutral targets in angry versus happy crowds; (2) by examining RTs for the detection of happy targets in angry crowds versus its reciprocal angry targets in happy crowds; (3) and by examining RTs in no target trials in angry versus happy crowd searches. The anger inferiority effect was found only in the second reciprocal analysis. However, when comparing converse conditions it is uncertain whether any significant results are due to the anger superiority of target effects, the anger inferiority of crowd effects, or some combination of both these effects, as both the target and crowd may be simultaneously relevant.

These results of Study Two partially supported the previous research and theoretical assumptions of Pratto and John (1991), which point to more extensive processing for negative versus positive stimuli. And, consistent with a very robust finding in the face-in-the-crowd literature (Byrne & Eysenck, 1995; Gilboa-Schechtman and colleagues 1999; Hampton and colleagues 1989; Hansen & Hansen 1988, 1994; Lundqvist and colleagues, 1999; Purcell and colleagues, 1996), closer investigation of Study Two does reveal significant differences in emotional versus non-emotional crowd searches. Reaction times were longer for angry versus neutral crowd searches ($P < .001$ for happy targets in angry versus neutral crowds; $P < .01$ for no target trials in angry versus neutral crowds), and RTs were longer for happy versus neutral crowd searches ($P < .001$ for angry targets in happy versus neutral crowds; $P < .01$ for no target trials in happy versus neutral crowds). A reasonable supposition from these results is that the degree of difficulty in processing between emotional and non-emotional stimuli is greater than the degree of difficulty in processing between positively and negatively valenced emotional stimuli.

5.1.3 Anxiety and the Anger Superiority Effect in Target Detection

Byrne and Eysenck (1995) and Gilboa-Schechtman and colleagues (1999) were interested in further exploring the affective component to the face-in-the-crowd findings. Both hypothesized that anxiety may intensify the anger superiority effect for target detection and aimed to test group differences between high anxious and low anxious, or non-anxious individuals. Although both found significant Group x Target effects, these effects were somewhat different in their conclusions, as outlined below.

Byrne and Eysenck (1995) found that anxious individuals detected angry targets faster than their low anxious counterparts, but given the results of an omnibus target effect of faster detection for happy targets over angry targets, perhaps a better way of phrasing their results is that low anxious participants are slow in finding angry targets, whereas anxious participants are equally fast at detecting angry and happy targets (see Figure D-1). These findings do not support the evolutionary hypothesis that there is an orienting response for angry targets. Byrne and Eysenck (1995) also found that although these group effects were significant for those scoring differentially on trait anxiety, however, this effect did not hold for state anxiety, as manipulation of state anxiety through anxious mood induction showed no appreciable effects. This indicates that anxiety group differences may be more characterological in nature than situational.

The results of Study One did not support the conclusions of Byrne and Eysenck (1995) in the matter of trait versus state anxiety in that both types of anxiety had an effect on face-in-the-crowd outcomes. Participants were placed into groups based on the Trait scale of the STAI, and were also asked to report on their anxious state (SAQ - question three) after having finished the computer task. The results of Study One indicated that having high trait anxiety may aid an individual in faster detection of angry versus happy targets, whereas state anxiety may speed an individual's RT overall (see Figure D-6 for trait anxiety effects; see Figure D-7 and Figure D-8 for state anxiety effects).

Gilboa-Schechtman and colleagues (1999) found an overall anger superiority effect such that for both groups angry targets were detected faster than happy targets in neutral crowds. They also found a significant Group x Target interaction such that participants with generalized social phobia detected angry targets faster than their non-anxious counterparts, but the two groups did not differ on their speed at finding happy targets (see Figure D-2). Perhaps a better way of phrasing their results is that high anxious individuals are slow in detecting happy targets. As both groups were faster at detecting the angry targets, these findings do support the evolutionary hypothesis that there is an orienting response for angry targets, but do not support the hypothesis that this response would be exaggerated for anxious individuals over non-anxious controls.

Study One tended to support the findings of Gilboa-Schechtman and colleagues (1999), as there was an overall anger superiority effect detected, and one might conclude that high anxious individuals are slower in detecting happy targets. The similarity of results may be somewhat confounded, however, as the current experimental design more closely duplicated the Gilboa-Schechtman and colleagues (1999) experimental design, including using the same procedural protocol and facial stimulus displays. It would be interesting to see if these results would generalize over multiple research designs.

5.1.4 Anxiety and the Anger Inferiority Effect in Crowd Processing

Byrne and Eysenck (1995) and Gilboa-Schechtman and colleagues (1999) were also interested in exploring the anger inferiority effect at the level of crowd processing in face-in-the-crowd studies. Both hypothesized that anxiety may intensify the anger inferiority effect for crowd processing and aimed to test group differences between high anxious and low anxious, or non-anxious individuals. Although both found significant Group x Crowd interaction effects, these effects were also somewhat different in their conclusions, as outlined below.

In a crowd analysis, Byrne and Eysenck (1995) found a significant Group x Crowd interaction in that the high trait anxious participants were significantly faster at locating an angry face in a happy crowd than a happy face in an angry crowd, whereas the low trait anxious participants did not differ in their response times over both crowd conditions.

Neither Gilboa-Schechtman and colleagues (1999) nor Study Two were able to replicate this interaction. However, as aforementioned, in Study Two a main effect of Crowd did emerge such that participants were slower to detect happy targets in angry crowds than happy targets in neutral crowds, indicating an overall anger inferiority effect at the level of crowd processing for angry versus neutral crowds. The results of Study Two indicate that trait anxiety does not appear to intensify the anger inferiority effect.

In crowd analyses, Gilboa-Schechtman and colleagues (1999) found two significant Group x Crowd interactions. The first interaction they found was in an analysis of non-target trials in angry versus neutral crowd searches. Here, the generalized social phobia group was slower in their RTs in angry crowds versus neutral crowds, whereas the non-anxious controls did not differ in their RTs for non-target trials in angry versus neutral crowds. The second interaction they found was in an analysis of RTs for finding angry targets in neutral crowds with its converse condition, neutral targets in angry crowds. Here, the generalized social phobia group was slower in their response times in finding neutral targets in angry crowds versus angry targets in neutral crowds, whereas the non-anxious controls did not differ in their RTs for finding angry targets in neutral crowds versus its converse condition, neutral targets in angry crowds.

Study Two did not replicate either of these interactions. However, as aforementioned, in the present study a main effect of Crowd did emerge such that participants were slower in their responses to angry crowds versus neutral crowds in non-target trials. Study Two also showed a main effect of Crowd such that participants were slower in finding neutral targets in angry crowds versus angry targets in neutral crowds. Together these main effects indicate an overall anger inferiority effect at the level of crowd processing for angry versus neutral crowds, but, again, trait anxiety does not appear to intensify the anger inferiority effect.

Although there were no significant group or interaction effects for trait anxiety in Study Two, the significant group effects for state anxiety previously found in the target analyses of Study One seemed to generalize to the crowd analyses of Study Two. As in the target analyses of Study One, high state anxiety was found to speed an individual's RT overall (see Figure D-8, Figure D-18, and Figure D-19 for state anxiety effects).

In addition to these state anxiety group effects, there was significant State Anxiety x Crowd interaction found for neutral targets in angry versus happy crowds such that the High Anxious group had faster RTs than the Low Anxious group during angry crowd searches, but the two groups showed no significant difference in their RTs for happy crowd searches. This result is contrary to the hypothesis that increased anxiety will result in slower processing of angry crowds.

Taken together, the studies of Byrne and Eysenck (1995), Gilboa-Schechtman and colleagues (1999), and Study Two give us some puzzling results regarding the face-in-the-crowd procedure and affective processing. There is clearly some interplay between anxiety and target detection and crowd searches, but given the discrepancies, it is not clear what role anxiety plays. It is possible that these puzzling results are a consequence of a complex interplay between trait and state anxiety that has yet to be explained, or perhaps the puzzling results are more indicative of examining only one process in what may be a dual-process task. Investigating the effects of affective processing in isolation may account for the inconsistent anxiety effects in the face-in-the-crowd studies. It is hoped that by investigating the effects of a second process, cognitive decision-making style, in conjunction with affective processing, some of these puzzling results may be clarified.

5.2 Novel Face-in-the-Crowd Findings

5.2 1 Rational Versus Experiential Decision-Making Styles

Perhaps the most significant findings of both Study One and Study Two are the group differences in RTs between rational and experiential thinking styles across numerous analyses. Specifically, the Rational group was found to have significantly overall faster RTs than the Experiential group in the following analyses: (1) happy versus neutral targets in angry crowds; (2) angry targets in neutral crowds versus neutral targets in angry crowds; (3) angry targets in happy crowds versus happy targets in angry crowds; (4) happy targets in angry versus neutral crowds; (5) no target trials in angry versus neutral crowds. In addition to this, the Rational group had trends toward overall faster RTs than the Experiential group in the following analyses: (1) angry versus happy targets in neutral crowds; (2) neutral target in angry versus happy crowds; (3) no target trials in angry versus happy crowds. In no analysis did the Experiential group have significant overall RTs that were faster than the Rational group. In no analysis did the Experiential group even have a trend toward overall RTs that were faster than the Rational group.

Although there was no significant correlation between the total rational score on the REI and self-reported state anxiety (SAQ- question three), it is interesting to note that both high state anxious and high rational individuals tended to have faster RTs on the whole. This leads one to suspect a relative facility in the underlying processes of state anxiety and rational thinking style.

To examine this supposition more fully, the present study examined the combined role of decision-making style and affect in the speed of target detection and crowd searches.

Decision-Making Style x Trait Anxiety and the anger superiority effect of target detection. The hypotheses of Study One regarding Decision-Making Style and Trait Anxiety stem from the theoretical assumptions that rational participants are faster than experiential participants on the whole because they spend little time on affective processing, and that high anxious participants would experience an exaggerated faster orienting response to angry targets compared to their low anxious counterparts. As such, the greatest difference in RTs for angry targets should be between the High Trait Anxious/Rational (HTAR) and the Low Trait Anxious/Experiential (LTAE) groups. Also, if the reason for the puzzling affective results in previous studies is due to neglect of the consideration of an individual's decision-making style, then we should also see a difference between the High Trait Anxious/Rational (HTAR) group and the High Trait Anxious/Experiential (HTAE) group, as well as the Low Trait Anxious/Rational (LTAR) group and the Low Trait Anxious/Experiential (LTAE) group.

Unfortunately, none of these hypotheses for Study One regarding Decision-Making Style x Trait Anxiety were substantiated, indicating that the addition of the decision-making variable to trait anxiety did not have the desired outcome of clarifying the previously inconsistent trait anxiety findings. Moreover, in no instance did the addition of trait anxiety have an impact on non-significant decision-making style findings for angry target trials. It is therefore more likely that the orienting response is a selective or competitive dual process design, and less likely that the orienting response is a consolidative or corrective dual process design.

Decision-Making Style x State Anxiety and the anger superiority effect of target detection. Based on the previous research of Byrne and Eysenck (1995), who examined state anxiety with anxious mood induction during the face-in-the-crowd task, it was hypothesized in Study One that state anxiety would have no appreciable decision-making style x state anxiety effects on face-in-the crowd outcomes, and neither would the significant difference in RTs previously evidenced between the Rational and Experiential groups be affected by the addition of the state anxiety variable.

These hypotheses of Study One regarding decision-making style x state anxiety were partially substantiated. Although there were no decision-making style x state anxiety effects, the previously significant decision-making style group effect for angry targets in neutral crowds was rendered insignificant after the addition of the state anxiety variable. It is therefore more likely that the orienting response is a competitive or consolidative design, and less likely that the orienting response is a selective or corrective dual process design.

Decision-Making Style x Trait Anxiety and the anger inferiority effect in crowd processing. The hypotheses of Study Two regarding Decision-Making Style and Trait Anxiety stem from the theoretical assumptions that rational participants are faster than experiential participants on the whole because they spend little time on affective processing, and that high anxious participants would experience an exaggerated slowing in their processing of angry crowds compared to their low anxious counterparts because they become mired in affective processing when the crowd is angry. As such, the greatest difference in RTs for angry crowds should be between the High Trait Anxious/Experiential (HTAE) and the Low Trait Anxious/Rational (LTAR) groups. Also, if the reason for the puzzling affective results in previous studies is due to neglect of the consideration of an individual's decision-making style, then we should also see a difference between the High Trait Anxious/Experiential (HTAE) group and the High Trait Anxious/Rational (HTAR) group, as well as the Low Trait Anxious/Experiential (LTAE) group and the Low Trait Anxious/Rational (LTAR) group.

The results of Study Two regarding Decision-Making Style x Trait Anxiety were complex; that is, they were substantiated in a few of the analyses and were unsubstantiated in a few of the analyses, and were contradicted in none of the analyses. Specifically, the HTAE group did indeed have longer RTs than the LTAR group in no target angry crowd searches. The HTAE group also showed a trend toward longer RTs than the HTAR group when searching for happy targets in angry crowds. The most robust finding, however, was between the LTAE and LTAR groups. Here, the LTAE group had significantly slower RTs than the LTAR group in no target angry crowd searches, and showed trends toward significantly slower RTs during neutral target in angry crowd searches and happy target in angry crowd searches. What is notable about these findings is that in each of these analyses consideration of dual processing adds incremental value, as none of these significant findings were evidenced in trait anxiety analyses in isolation.

Although these findings of Study Two are noteworthy, it is also important to appreciate that the addition of the trait anxiety variable did not change the already significant stand-alone differences in decision-making style RTs, as the Rational group was already significantly faster than the Experiential group for all angry crowd searches. It is therefore more likely that the anger inferiority effect in angry crowd searches is a consolidative or corrective dual process design, and less likely that the anger inferiority effect is a selective or competitive dual process design.

Decision-Making Style x State Anxiety and the anger inferiority effect in crowd processing. Based on the previous research of Byrne and Eysenck (1995), who examined state anxiety with anxious mood induction during the face-in-the-crowd task, it was hypothesized in Study Two that state anxiety would have no appreciable decision-making style x state anxiety effects on face-in-the-crowd outcomes, and neither would the significant difference in RTs previously evidenced between the Rational and Experiential groups be affected by the addition of the state anxiety variable.

The hypotheses of Study Two regarding decision-making style x state anxiety effects were substantiated for all analyses save two. There was a significant effect of decision-making style x state anxiety for LSAE versus LSAR groups for happy targets in angry crowds, and for no target trials in angry crowds such that the LSAE group had significantly longer RTs during these angry crowd searches. However, only in the no target trials in angry crowd searches did this change a previously non-significant decision-making style result to significance, as the Rational group was already significantly faster than the Experiential group at finding happy targets in angry crowds.

Contrary to the hypotheses of Study Two, the significant difference in RTs previously evidenced between the Rational and Experiential groups was greatly affected by the addition of the state anxiety variable. Specifically, the addition of state anxiety rendered the majority of previously significant between group results for neutral targets in angry crowds, happy targets in angry crowds and no target in angry crowds insignificant. It is therefore more likely that the anger inferiority effect in angry crowd searches is a consolidative or corrective dual process design, and less likely that the anger inferiority effect is a selective or competitive dual process design.

5.2.2 Facial Processing and Physiological Arousal

Hansen and Hansen (1994) began the foray into physiological arousal measurement during face-in-the-crowds tasks by measuring facial efference through electromyography to happy and angry facial displays. Higher automatic enervation of the corrogator supercilii muscle was evidenced during presentation of angry versus happy stimuli. Gilboa-Schechtman and colleagues (1999) called for further physiological measures to help complete the picture. As such, the current research sought to investigate the possibility of physiological arousal during the-face-in-the-crowd procedure through measurement of participants' GSR.

Only four differences in GSR were found for participants during the target detection analyses of Study One. (1) As expected, the High Trait Anxious Group experienced higher GSR than the Low Trait Anxious Group, but this between subjects effect did not differ as a function of target type. (2) The Rational group experienced higher GSR for happy versus angry targets, whereas the Experiential group did not experience this difference. (3) The LTAR group experienced higher GSR for happy versus angry targets, whereas the LTAE group did not experience this. (4) The LSAR group experienced higher GSR for happy versus angry targets, whereas the LSAE group did not experience this difference.

There were six differences in GSR evidenced for participants during the crowd searches of Study Two, all of which were in the expected directions. (1) There was a significant interaction effect of Trait Anxiety x Crowd such that the High Trait Anxious group experienced higher GSR to angry versus happy crowds, whereas the Low Trait Anxious group did not experience a difference in GSR between crowd types. (2) There was a significant between subjects effect such that the HTAE group experienced higher GSR than the LTAR group. (3) There was a significant interaction effect such that the HTAE group experienced higher GSR to angry versus happy crowds, whereas the LTAR group did not experience a difference in GSR between crowd types. (4) There was a significant interaction effect such that the HTAE group experienced higher GSR to angry versus happy crowds, whereas the HTAR group did not experience a difference in GSR between crowd types. (5) There was a significant between subjects effect such that the HSAE group experienced higher GSR than the LSAR group. (6) There was a significant between subjects effect such that the LSAE group experienced higher GSR than the LSAR group.

Although these combined Decision-Making-Style x Anxiety findings for Study Two crowd analyses are noteworthy, it is also important to appreciate that the addition of the decision-making style variable did not change the already significant stand-alone differences in anxiety group physiological findings.

5.3 Theoretical Implications

5.3.1 The Face-in-the-Crowd and the Affective-Infusion Model

The AIM is a network theory that advocates the important role of decision-making style in determining the degree of affective influence in the outcome of a decision. Hansen and Hansen might phrase this concept as the degree to which controlled attentional resources were able to suppress or enhance automatic affective influences in behavioural outcomes.

The AIM outlines four processing strategies that may be relevant to outcomes in the face-in-the-crowd procedure. The first strategy is the direct access strategy that involves crystallized, predetermined evaluations when objects or situations do not need extensive processing. Utilization of this strategy resists affect infusion. The second strategy is the motivated processing strategy which involves processing that is guided by a strong, pre-existing objective for a highly disciplined search. Utilization of this strategy has minimal affect infusion. The third strategy is the heuristic processing strategy which involves the computation of a response with mental short-cuts such as using affect-as-information. Utilization of this strategy has moderate affect infusion. The fourth strategy is the substantive processing strategy which involves the most constructive and involved response formations. Utilization of this strategy has the greatest likelihood of affect infusion.

It was predicted that the Rational group, who by definition are more direct and disciplined in their thinking, would default to using either the direct access or motivated processing strategy in the face-in-the-crowd task, translating to faster RTs on the whole because of minimal affective processing. It was also predicted that the Experiential group, who by definition are more influenced by their gut reactions and emotions, would default to using either the heuristic or substantive processing strategy in the face-in-the-crowd task, translating to slower RTs on the whole because of more substantial affective processing.

Theoretically, the predictions regarding RTs and the differing processing styles in the AIM for Rational and Experiential groups were substantially upheld. The Rational group tended to have faster RTs than the Experiential group overall. By examining the flow chart of decision-making (see Figure D-3), we can see how the Rational, Experiential, High Anxious and Low Anxious participants might choose a strategy:

Rational + Low Anxiety (low relevance/importance) = Direct Access Strategy.

Rational + High Anxiety (high relevance/importance) = Motivated Processing Strategy.

Experiential + Low Anxiety (positive affective state) = Heuristic Processing Strategy.

Experiential + High Anxiety (negative affective state) = Substantive Processing Strategy.

However thought-provoking the fit between the AIM and the face-in-the-crowd results may be, there are still some cautions that must be applied when interpreting this theory, especially in this context. The main criticism at this juncture is the sheer complexity of the AIM and its predictive capabilities. One can determine a number of reasons why a participant may fit into a given group or processing strategy category dependent on task familiarity, complexity and typicality of the task, personal relevance, personal motivation, processing capacity, and mood effects. For example, an experiential participant may use a substantive processing strategy until becoming familiar with a complex task or habituating to threatening stimuli, at which point the experiential participant may switch to a direct access strategy, and faster decision-making. Further research is required to test the model beyond the mere assumption that Rational = fast and Experiential = slow.

A second caution to applying the AIM to this context is that previous AIM studies have tended to focus on more lengthy decision-making processes instead of computer tasks where split-second judgments are necessary. For example, AIM has been used extensively in courtroom decision-making scenarios when a participant is asked to judge a defendant while their decision-making process is either manipulated or analyzed according to the four processing strategies. For this reason, it may be presumptuous to believe that anything other than the quick and relatively affect-free direct access strategy is being used in the face-in-the-crowd procedure. However, if only the direct access strategy is being used in the face-in-the-crowd procedure, then the anxiety and decision-making-style group differences in RTs become much harder to explain.

5.3.2 The Face-in-the-Crowd and CEST

It may be less problematic to draw theoretical parallels between CEST and the current research as the selection of Rational and Experiential groups was based upon the Rational-Experiential Inventory (REI), an instrument uniquely designed to tap into the theoretical constructs of CEST. CEST postulates that there are two systems that interact to produce behaviours that will cope with current environmental demands (Epstein, 1998). The rational system draws upon an explicit, conscious theory of reality. Hansen and Hansen might term this a controlled processing system. The experiential system draws upon an implicit, unconscious theory of reality. Hansen and Hansen might term this an automatic processing system. Furthermore, the rational system is associated with reason-oriented, affect-free thinking, whereas the experiential system is non-analytical and intimately associated with affect.

It was predicted that the Rational group, who by definition are more direct and disciplined in their thinking, would default to using the rational system in the face-in-the-crowd task, translating to faster RTs on the whole because of minimal affective processing. It was also predicted that the Experiential group, who by definition are more influenced by their gut reactions and emotions, would default to using the experiential system in the face-in-the-crowd task, translating to slower RTs on the whole because of more substantial affective processing.

Theoretically, the predictions regarding RTs and the rational and experiential systems were substantially upheld. The Rational group tended to have faster RTs than the Experiential group overall.

However, there are also some cautions to applying this theory too liberally in this context as well. The main difficulty pertains to the broad and seemingly contradictory facets within the two systems when viewed in light of the current task. It is possible that only some, but not all facets of a system are in play during the face-in-the-crowd procedure. For example, the rational system is described as being relatively slower than the experiential system, leading one to assume that the Rational group would have slower RTs than the Experiential group. This was not the case. On the other hand, the rational system is described as being relative affect-free whereas the experiential system is affect-laden. This leads one to assume that the Rational group would have faster RTs than the Experiential group. This was substantiated. Yet, it is also clear that the picture is more complex than an examination of affective processing alone, as the decision-making style findings tended to be both different and more robust than the findings for High

Anxious and Low Anxious groups. The assumption that rational processing is affect-free may not be the greatest contributing factor behind the faster RTs.

A second caution in the theoretical assumption of CEST in conjunction with the face-in-the-crowd task pertains to the supposition that an individual selected into the Rational group will exclusively use their rational systems during the task, whereas a participant selected into the Experiential group will use their experiential system during the task. As rational thinking and experiential thinking are meant to be orthogonal constructs, it is possible that a participant may use one or both systems (a corrective dual process design). Anticipating this difficulty, group selection into the Rational group was dependent on both a high rational and low experiential score and selection into the Experiential group was dependent on both a high experiential and low rational score. It is unknown, however, whether this preemptive action forestalled any theoretical blurring between groups.

5.5 Limitations and Future Directions

There are a few limitations to the current research. The first limitation is in regards to the ecological validity of the selected stimuli. Efforts have been made to control for artifacts such as the light and dark confound of the original Hansen and Hansen (1988) stimuli by making all targets and crowds photographs of the same female individual with the only variations being that of the facial expression. Though photographs have more ecological validity than schematic stimuli, there will never be a situation in which a person comes across a crowd of the same twelve individuals neatly arranged in columns and rows.

As such, future studies could vary the stimuli to include arrays of differing sizes, with different individuals placed in random positions on the computer screen. For even greater ecological validity, an experiment could be conducted in which a person enters a room with crowds of happy, angry and neutral actors with instructions to find the discrepant emotional face.

A second limitation is in regards to the categorization of participants into the Rational and Experiential groups. As aforementioned, there is no guarantee that a participant with a high Rational Scale score will use a direct or motivated processing style, or that a participant with a high Experiential Scale score will use a heuristic or substantive processing style. Epstein, Pacini, Denes-Raj, and Heier (1999) explain that the two scales measure two parallel, interactive information processing systems, and though people are more likely to use the processing style indicated by their rational and experiential scores, people are also able to vary their responses when asked to adopt either the rational or experiential processing style for a given task. In the current project, it is unknown whether the experimental design is such that it elicits the use of one style of processing over the other. For example, stimuli organized in columns and rows may facilitate a rational linear search, whereas stimuli arranged haphazardly may facilitate a more heuristic approach.

Future research could vary the type of stimulus array (linear or haphazard) to determine if there are any Rational or Experiential group effects. Future research could also utilize fMRI technology to determine if rational and experiential participants utilize different neural pathways during a face-in-the-crowd task. It is reasonable to suggest that if the rational system is an evolutionarily newer system, then more activity would be seen in the neocortex, whereas the experiential system may display more activity in the limbic system.

A third limitation is in regards to the categorization of participants into the High State Anxiety and Low State Anxiety groups. Selection into these groups was based upon a single question (SAQ – question three), "Did you feel anxious during the task: (a) yes or (b) no?" which does not have the same tried and tested psychometric properties as the State Scale of the STAI.

Future studies could be conducted using the STAI State Scale following the face-in-the-crowd procedures.

A fourth limitation is in regards to the Eprime stimuli presentation software and GSR AcqKnowledge software program's communication and recording capabilities. Though it was possible to record global readings for GSR for the target and crowd analyses, it was not possible to further break down these findings into the same analyses categories used in the RT data from the Eprime software. The Eprime software needed to send a five volt signal through a printer cable to the AcqKnowledge software each time a given stimuli was presented. The five volt signal would turn on and off the AcqKnowledge software's recording. The Eprime computer code was such that a signal could be sent based on target or crowd, but not the combination of targets and crowds. For example, angry targets could not be broken down and analyzed by crowd type, but instead remained a collective reading that included combined angry targets in neutral crowds and angry targets in happy crowds. This made it difficult to tease apart GSR findings and correlate them to RT data for the typical analyses used in previous face-in-the-crowd research.

As new technology becomes available, future studies may be able to overcome this software difficulty. It would also be useful to examine a variety of measures of autonomic arousal to substantiate or refute the current findings and provide generalizability.

A fifth limitation is in regards to group creation and statistical power. Though it was relatively easy to screen enough people to create a High Anxiety group and a Low Anxiety groups, as well as a Rational group and an Experiential groups, it was difficult to create combinations of these groups with a sufficient number of participants for statistical significance. In particular, the High Anxious Experiential and High Anxious Rational cells were difficult to fill to achieve a sufficient degree of statistical power.

Future research could recruit more participants into the High Anxious Experiential and High Anxious Rational cells to increase statistical power.

Despite its limitations, the conclusions drawn from the two current face-in-the-crowd studies collectively serve to expand our understanding of previous face-in-the-crowd findings by examining the roles of both the affective component of trait and state anxiety and the decision-making style component of the rational and experiential thinking systems in the speed of detection and physiological arousal to facial stimuli.

The two current studies succeeded in replicating previous face-in-the-crowd research in terms of target, crowd, and anxiety effects, and provided novel and incremental findings regarding rational and experiential thinking styles. Perhaps the most exciting findings are the group differences in RTs between Rational and Experiential groups in both target detection and crowd searching tasks. The Rational group displayed faster RTs across numerous analyses, whereas in no analysis did the Experiential group have RTs that were faster than the Rational group. This validates decision-making style as an important dimension to be considered in future face-in-the-crowd research. The research also provided limited but cautiously promising support for network theories in face-in-the-crowd studies and it is hoped that future studies might endeavor to further explore facial processing within these theoretical frameworks.

6. REFERENCES

Bargh, J. A., (1989). Conditional automaticity: Varieties of automatic influence in social perception and cognition. In J. S. Uleman & J. A. Bargh (Eds.), *Unintended thought.* (pp. 3-51). New York: Guilford Press.

Bradley, M. M., & Lang, P. J. (2001). Measuring emotion: Behaviour, feeling and physiology. In Lane & Nadel (Eds), *Cognitive neuroscience of emotion* (pp. 242-276).

Bruce, V., Ellis, A. W., Perret, D. I. (Eds.). (1992). *Processing the facial image*. New York, NY: Clarendon Press/Oxford University Press.

Bruyer, R. (2003). Impairments of facial nonverbal communication after brain damage. In P. Philippot (Ed.), *Nonverbal behavior in clinical settings* (pp. 171-309). London: Oxford University Press.

Beck, A. T., Brown, G. K, & Steer, R. A. (1996). *Beck Depression Inventory – II (BDI-II)*. San Antonio, TX: The Psychological Corporation.

Byrne, A., & Eysenck, M. W. (1995). Trait anxiety, anxious mood, and threat detection. *Cognition and Emotion, 6,* 549-562.

Cacioppo, J. T., & Petty, R. E. (1982). The need for cognition. *Journal of Personality and Social Psychology, 42,* 116-131.

Clore, G. L, Schwarz, N., & Conway, M. (1994). Affective causes and consequences of social information processing. In R.S. Wyer & T.K. Srull (Eds.), *Handbook of social cognition* (2nd ed., Vol.1, pp. 323-419). Hillsdale, NJ: Erlbaum.

Cornelius, R. R. (1996). Of elephants and blind men: Comparing the Darwinian, Jamesian, cognitive, and social constructivist perspectives on emotion. In *The science of emotion: Research and tradition in the psychology of emotion*. Prentice Hall: Upper Saddle River, NJ.

Eastwood, J. D., Smilek, D., & Merikle, P. M. (2001). Differential attentional guidance by unattended faces expressing positive and negative emotion. *Perception and Psychophysics, 63,* 1004-1013.

Ekman, P. (1992). Facial expressions of emotion: New findings, new questions. *Psychological Science, 3,* 34-38.

Ekman, P., & Friesen, W. V. (1975). *Unmasking the face.* Englewood Cliffs, NJ: Prentice-Hall.

Ekman, P., Levenson, R. W., & Friesen, W. V. (1983). Autonomic nervous system activity distinguishes between emotions. *Science, 221,* 1208-1210.

Epstein, S., Pacini, R., Denes-Raj, V., & Heier, H. (1996). Individual differences in Intuitive-Experiential and Analytical-Rational thinking styles. *Journal of Personality Disorders and Social Psychology, 71,* 340-405.

Epstein, S., Pacini, R., & Norris, P. (1998). *The Rational-Experiential Inventory, long form.* Unpublished inventory, University of Massachusetts at Amherst.

Fagan, J., (1972). Infants' recognition memory for faces. *Journal of Experimental Child Psychology, 14,* 453-476.

Farah, M.J., (1996). Is face recognition 'special'? Evidence from neuropsychology. *Behavioural Brain Research, 76,* 181-189.

First, M. B., Spitzer, R. L., Gibbon, M., & Williams, J. B. W. (1995). *Structured Clinical Interview for DSM-IV Axis I Disorders – Patient edition.* New York, USA: Biometric Research Department.

Forgas, J. P., (1999). Network theories and beyond. In T. Dalgleish & M. Power (Eds), *Handbook of cognition and emotion* (pp. 591-611). Chichester, UK: Wiley.

Forgas, J. P. (1995). Mood and judgment: The affect infusion model (AIM). *Psychological Bulletin, 117,* 39-66.

Fox, E., Lester, V., Russo, R., Bowles, R. J., Pichler, A., Dutton, K. (2000). Facial expressions of emotion: Are angry faces detected more efficiently? *Cognition and Emotion, 14,* 61-92.

Gilboa-Schechtman, E., Foa, E. B., & Amir, N. (1999). Attentional biases for facial expressions in social phobia: The face-in-the-crowd paradigm. *Cognition and Emotion, 13,* 305-318.

Gotlib, I. H., Abramson, L. Y., (1999). Attributional theories of emotion. In T. Dalgleish & M. Power (Eds), *Handbook of cognition and emotion* (pp. 613-636). Chichester, UK: Wiley.

Hampton, C. Purcell, D. G., Bersine, L., Hansen, C. H., & Hansen R. D. (1989). Probing "pop-out": Another look at the face-in-the-crowd effect. *Bulletin of the Psychonomic Society, 27,* 563-566.

Hansen, C. H., & Hansen, R. D. (1994). Automatic emotion: Attention and facial efference. In P. M. Niedertahl & S. Kitayama (Eds), *The heart's eye: Emotional influences in perception and attention* (pp. 217-243). San Diego, CA: Academic Press.

Hansen C. H., & Hansen R. D. (1988). Finding the face in the crowd: An anger superiority effect. *Journal of Personality and Social Psychology, 54,* 917-924.

Horna, D., Haver, B., & Schwartz, T. (1976). Perceptibility of schematic face stimuli: Evidence for a perceptual gestalt. *Memory and Cognition, 4,* 176-185.

Johnson, M.H., Morton, J., (1991). *Biology and Cognitive Development: The Case of Face Recognition.* Blackwell Press: Cambridge, MA.

Lang, P. J., Bradley, M. M.,& Cuthbert, B. N. (1990). Emotion, attention, and the startle reflex. *Psychological Review*, *97,* 377-395.

LeDoux, J.E. (1996). *The Emotional Brain: The Mysterious Underpinnings of Emotional Life.* New York: Simon & Schuster.

Levenson, R. W. (1992). Autonomic nervous system differences among emotions. *Psychological Science, 3,* 23-27.

Ludemann, P., Nelson, C.A., (1988). The categorical representation of facial expressions by 7-month-old infants. *Developmental Psychology, 24,* 492-501.

Maurer, D., Salapatek, P., (1976). Developmental changes in the scanning of faces by young children. *Child Development, 47,* 523-527.

Moscovitch, M., Winocur, G., Behrmann, M., (1997). What is special about face recognition? Nineteen experiments on a person with visual object agnosia and dyslexia but normal face recognition. *Journal of Cognitive Neuroscience, 9,* 555-604.

Nathanson, D. L. (1990). Project for the study of emotion. In Glick, R.A. & Bone, S. (Eds.), *Pleasure beyond the pleasure principle: The role of affect in motivation, development and adaptation* (pp. 81-110). New Haven CT: Yale University Press.

Nelson, C. A. (2001). The development and neural bases of face recognition. *Infant and Child Development, 10,* 3-18.

Northdurft, H. C. (1993). Faces and facial expressions do not pop out. *Perception, 22,* 1287-1298.

Oehman, A., Lundqvist, D., & Esteves, F. (2001). The face in the crowd revisited: A threat advantage with schematic stimuli. *Journal of Personality and Social Psychology, 80,* 381-396.

Oehman, A., & Soares, J. (1994). "Unconscious anxiety": Phobic responses to masked stimuli. *Journal of Abnormal Psychology, 103,* 231-240.

Pascalis, O., Bachevalier, J., (1998). Face recognition in primates: a cross-species study. *Behavioural Processes, 43,* 87-96.

Pacini, R., & Epstein, S. (1999). The relation of rational and experiential information processing styles to personality, basic beliefs, and the ratio-bias phenomenon. *Journal of Personality and Social Psychology, 76,* 972-987.

Pratto, F., & John, O. P. (1991). Automatic vigilance: The attention-grabbing power of negative social information. *Journal of Personality and Social Psychology, 61,* 380-391.

Purcell, D. G. & Stewart, A. L. (1981). A face superiority effect. *Bulletin of the Psychonomic Society, 24,* 118-120.

Purcell, D. G. & Stewart, A. L. (1986). The face-detection effect. *Bulletin of the Psychonomic Society, 24, 118-120.*

Purcell, D. G., Stewart, A. L., Botwin, M., & Kreigh, R. (1983). A face superiority effect: Hemiretina effects. *Bulletin of the Psychonomic Society, 21,* 351.

Purcell, D. G., Stewart, A. L., & Skov, R. B. (1996). It takes a confounded face to pop out of a crowd. *Perception, 25,* 1091-1108.

Radloff, L. S. (1977). The CES-D Scale: A self-report depression scale for research in the general public. *Applied Psychological Measurement, 1,* 385-401.

Roskos-Ewoldsen, D. R., & Fazio, R. H. (1992). On the orienting value of attitudes: Attitude accessibility as a determinant of an object's attraction of visual attention. *Journal of Personality and Social Psychology, 63,* 198-211.

Scherer, K. R. (1999). Appraisal theory. In T. Dalgleish & M. Power (Eds), *Handbook of* *cognition and emotion* (pp. 637-663). Chichester, UK: Wiley.

Schwartz, G. M., Izard, C. E., & Ansul, S. E. (1985). The five-month-olds ability to discriminate facial expressions of emotion. *Infant Behaviour and Development, 8,* 65-77.

Segerstrale, U. C. (Ed.). (1997). *Nonverbal communication: Where nature meets culture*. Hillsdale, NJ: Erlbaum.

Shiffrin, R. M., & Schneider, W. (1977). Controlled and automatic human information processing II: Detection, search, and attention. *Psychological Review, 84,* 127-190.

Spielberger, C. D., Gorsuch, R. L., Lushene, R., Vagg, P. R., & Jacobs, G. A. (1983). Manual for the State-Trait Anxiety Inventory (STAI). Palo Alto, CA: Consulting Psychologists Press.

Treisman, A., & Souther, J. (1985). Search asymmetry: A diagnostic for preattentive processing of separable features. *Journal of Experimental Psychology, 114,* 285-310.

Whalen, P.J., Rauch, S.L., Etcoff, N.L., McInerney, S.C., Lee, M.B., Jenike, M.A., (1998). Masked presentations of emotional facial expressions modulate amygdala activity without explicit knowledge. *Journal of Neuroscience 18,* 411-418.

White, M. (1995). Preattentive analysis of facial expressions of emotion. *Cognition and Emotion, 5,* 439-460.

Williams, D. E., Reingold, E. M, Moscovitch, M., & Behrmann, M. (1997). Patterns of eye movements during parallel and serial visual search tasks. *Canadian Journal of Experimental Psychology, 51,* 151-164.

Zajonc, R. B., & Markus, H. (1984). Affect and cognition: The hard interface. In C. E. Izard, J. Kagan, & R. B. Zajonc (Eds.), *Emotions, cognition, and behavior*. (pp. 73-102). Cambridge, England: Cambridge University Press.

APPENDIX A

GLOSSARY

AIM: Affect Infusion Model developed by Forgas (1995) is a dual process network theory that postulates that affective arousal spreads activation to cognitive systems that are linked to the emotion that is being aroused. Reciprocally, cognitive processes may also spread activation to affective systems. AIM advocates that an individual's decision-making style determines the degree to which affect is infused into the individual's constructive processing.

Anger Inferiority Effect: the ability to search through crowds of happy or neutral faces faster than crowds of angry faces.

Anger Superiority Effect: the ability to find an angry target faster than a happy or neutral target in a crowd of faces.

CES-D: Centre for Epidemiologic Studies Depression Scale developed by Radloff, 1977, is a self-report questionnaire consisting of 20 statements pertaining to the affective, somatic and interpersonal symptoms of depression.

CEST: Cognitive Experiential Self Theory developed by Epstein (1990) is a theory of personality encompassing two major conceptual systems, the rational and the experiential. According to CEST, individuals have an explicit, conscious theory of reality and an implicit, unconscious theory of reality that interact to produce behaviors that will cope with current environmental demands.

Competitive Design: a dual process model in which both processes are activated but only one process has control over behavioral output.

Consolidative Design: a dual process model in which both processes are activated and both processes have control over behavioral output.

Corrective Design: a dual process model in which sometimes both processes are activated and *sometimes* both processes have control over behavioral output.

Dual Process Models: there is more than one underlying process influencing behavioral outcome.

Experiential System: a system of CEST considered to be unconscious, relatively rapid, non-analytical, affect-laden, and has a longer evolutionary history. Experiential thinking tends to be effortless, pleasure-and-pain oriented and changes slowly with repetitive or intense experience.

Face-in-the-Crowd Paradigm: an experimental protocol whereby participants are asked to identify target emotional faces in a stimulus array of faces.

GSR: galvanic skin response.

HSAE: the High State Anxious Experiential group.

HSAR: the High State Anxious Rational group.

HTAE: the High Trait Anxious Experiential group.

HTAR: the High Trait Anxious Rational group.

LSAE: the Low State Anxious Experiential group.

LSAR: the Low State Anxious Rational group.

LTAE: the Low Trait Anxious Experiential group.

LTAR: the Low Trait Anxious Rational group.

Rational System: a system of CEST considered to be a conscious, relatively slow, analytical, and affect-free system of thinking that has a very brief evolutionary history. Rational thinking tends to be effortful, logical and reason-oriented and changes rapidly and easily, especially with the strength of an argument or new evidence.

REI: Rational-Experiential Inventory developed by Epstein, Pacini, & Norris, 1998, is a 40 item self-report inventory that contains 20 questions assessing one's level of rational thinking, and 20 questions assessing one's level of experiential or intuitive thinking.

Selective Design: a dual process model in which only one process is activated and it has sole control over behavioral output.

RT: reaction time.

SAQ: Search Strategy and Anxiety Questionnaire, is a four item self-report questionnaire assessing participants' concerns for speed and accuracy, and level of anxiety during the current studies.

SD: standard deviation.

STAI: State-Trait Anxiety Inventory developed by Spielberger, 1983. It contains 20 questions assessing one's level of anxiety *right now* (state anxiety) and 20 questions assessing one's level of anxiety *generally* (trait anxiety).

APPENDIX B

TABLES

TABLE B-1

Comparison of the Experiential and Rational Systems

Experiential System		Rational System	
1.	Holistic responding	1.	Analytic responding
2.	Automatic, effortless processing	2.	Intentional, effortful processing
3.	Affective processing: Pleasure-or-pain-oriented (what feels good or bad)	3.	Logical processing: Reason-oriented (what is rational)
4.	Associative connections	4.	Logical connections
5.	Encoding of reality in concrete images, metaphors, and narratives	5.	Encoding of reality in abstract symbols, words, and numbers
6.	More rapid processing: Oriented to immediate action	6.	Slower processing: Oriented to delayed action
7.	Slower, more difficult changes: Changes with repetitive or intense experience	7.	More rapid, easier changes: Changes with strength of argument and new evidence
8.	More crudely differentiated constructs: Broad generalization gradient, stereotypical thinking	8.	More highly differentiated constructs
9.	More crudely integrated and less coherent networks: Dissociative, emotional complexes; context-specific processing	9.	More highly integrated and coherent networks: Context-general principles
10.	Passive experience of events: We are seized by our emotions	10	Active and conscious experience of events: We are in control of our thoughts
11.	Self-evident validity: “Experiencing is believing”	11.	Need for justification via logic and evidence

TABLE B-2

Means and (Standard Deviations) of Detection Times (msec) as a Function of Type of Target and Type of Crowd for High Trait Anxious and Low Trait Anxious Groups.

Type of Target	*Type of Crowd*					
	Angry		*Happy*		*Neutral*	
	HighAnx	*LowAnx*	*HighAnx*	*LowAnx*	*HighAnx*	*LowAnx*
Angry	3424	3145	2223	2155	1904	1841
	(1542)	(1065)	(516)	(516)	(539)	(453)
Happy	2322	2270	3408	3305	1991	1835
	(619)	(593)	(1192)	(1154)	(683)	(453)
Neutral	2247	2213	2280	2291	3362	2889
	(728)	(543)	(575)	(536)	(2216)	(896)

TABLE B-3

Means and (Standard Deviations) of Detection Times (msec) as a Function of Type of Target and Type of Crowd for High State Anxious and Low State Anxious Groups.

	Type of Crowd					
Type of Target	*Angry*		*Happy*		*Neutral*	
	HighAnx	*LowAnx*	*HighAnx*	*LowAnx*	*HighAnx*	*LowAnx*
Angry	2936	3584	2084	2222	1749	1924
	(985)	(1768)	464	531	(365)	(545)
Happy	2182	2367	3121	3515	1770	1981
	(555)	(618)	(1071)	(1380)	(456)	(587)
Neutral	2078	2341	2244	2293	2682	3304
	(477)	(703)	(560)	(514)	(188)	(156)

TABLE B-4

Means and (Standard Deviations) of Detection Times (msec) as a Function of Type of Target and Type of Crowd for High Rational / Low Experiential and High Experiential / Low Rational Groups.

Type of Target	*Type of Crowd*					
	Angry		*Happy*		*Neutral*	
	HighRat LowExp	*HighExp LowRat*	*HighRat LowExp*	*HighExp LowRat*	*HighRat LowExp*	*HighExp LowRat*
Angry	2998	3858	2133	2347	1856	2043
	(899)	(1603)	(464)	(600)	(441)	(614)
Happy	2147	2493	3389	3609	1802	2071
	(476)	(608)	(1310)	(1317)	(431)	(661)
Neutral	2133	2481	2241	2371	2852	3910
	(471)	(769)	(514)	(519)	(861)	(2784)

TABLE B-5

Means and (Standard Deviations) of Detection Times (msec) as a Function of Type of Target and Type of Crowd for Trait Anxiety x Decision-Making Style Groups.

Type of Target	*Type of Crowd*			
	Angry			
	HAR	*LAR*	*HAE*	*LAE*
Angry	2938	3027	3958	3758
	(872)	(927)	(1917)	(1270)
Happy	2073	2183	2486	2500
	(445)	(495)	(625)	(610)
Neutral	2109	2145	2504	2458
	(429)	(498)	(972)	(527)
	Happy			
	HAR	*LAR*	*HAE*	*LAE*
Angry	2132	2134	2362	2332
	(517)	(448)	(534)	(677)
Happy	3416	3376	3620	3597
	(1248)	(1364)	(1278)	(1397)
Neutral	2167	2277	2326	2416
	(499)	(528)	(449)	(592)
	Neutral			
	HAR	*LAR*	*HAE*	*LAE*
Angry	1807	1880	2109	1977
	(345)	(485)	(717)	(506)
Happy	1809	1798	2165	1977
	(509)	(401)	(836)	(430)
Neutral	2944	2808	4452	3368
	(962)	(826)	(3777)	(1060)

TABLE B-6

Means and (Standard Deviations) of Detection Times (msec) as a Function of Type of Target and Type of Crowd for State Anxiety x Decision-Making Style Groups.

Type of Target	*Type of Crowd*			
	Angry			
	HAR	*LAR*	*HAE*	*LAE*
Angry	2849	3113	3383	4044
	(845)	(942)	(1278)	(1702)
Happy	2130	2160	2235	2594
	(499)	(469)	(451)	(639)
Neutral	2035	2208	2275	2561
	(355)	(540)	(609)	(822)
	Happy			
	HAR	*LAR*	*HAE*	*LAE*
Angry	2165	2110	2274	2375
	(463)	(476)	(556)	(626)
Happy	3360	3412	3390	3694
	(1542)	(1143)	(1178)	(1383)
Neutral	2263	2224	2428	2348
	(575)	(477)	(536)	(522)
	Neutral			
	HAR	*LAR*	*HAE*	*LAE*
Angry	1765	1926	1939	2084
	(339)	(502)	(521)	(653)
Happy	1715	1867	1927	2127
	(431)	(430)	(360)	(746)
Neutral	2693	2973	3181	4195
	(692)	(970)	(1250)	(3170)

TABLE B-7

Means and (Standard Deviations) of mean GSR (uhmo) as a Function of Type of Target for High Trait Anxious, Low Trait Anxious Groups, High State Anxious and Low Trait Anxious Groups.

	Group			
Type of Target	*HighTraitAnx*	*LowTraitAnx*	*HighStateAnx*	*LowStateAnx*
Angry	4.724	3.820	4.139	4.099
	(2.673)	(2.605)	(2.467)	(2.740)
Happy	4.740	3.869	4.133	4.147
	(2.727)	(2.576)	(2.463)	(2.756)
Neutral	4.743	3.817	4.142	4.116
	(2.711)	(2.575)	(2.497)	(2.730)

TABLE B-8

Means and (Standard Deviations) of mean GSR (uhmo) as a Function of Type of Target for High Rational / Low Experiential and High Experiential / Low Rational Groups.

.

	Group	
Type of Target	*HighRat LowExp*	*HighExp LowRat*
Angry	3.522	4.259
	(2.461)	(2.537)
Happy	3.693	4.245
	(2.569)	(2.518)
Neutral	3.576	4.238
	(2.492)	(2.539)

TABLE B-9

Means and (Standard Deviations) of mean GSR (uhmo) as a Function of Type of Target for Trait Anxiety x Decision-Making Style Groups.

	Group			
Type of Target	*HAR*	*LAR*	*HAE*	*LAE*
Angry	3.847	3.331	4.336	4.178
	(3.248)	(1.949)	(2.064)	(3.036)
Happy	3.913	3.563	4.370	4.111
	(3.439)	(2.007)	(2.074)	(2.990)
Neutral	3.855	3.412	4.394	4.072
	(3.319)	(1.954)	(2.166)	(2.953)

TABLE B-10

Means and (Standard Deviations) of mean GSR (uhmo) as a Function of Type of Target for State Anxiety x Decision-Making Style Groups.

	Group			
Type of Target	*HAR*	*LAR*	*HAE*	*LAE*
Angry	3.973	3.257	4.430	4.189
	(2.534)	(2.454)	(2.307)	(2.674)
Happy	4.039	3.489	4.350	4.202
	(2.588)	(2.616)	(2.175)	(2.692)
Neutral	4.057	3.293	4.327	4.202
	(2.667)	(2.420)	(2.161)	(2.724)

TABLE B-11

Means and (Standard Deviations) of mean GSR (uhmo) as a Function of Type of Crowd for High Trait Anxious, Low Trait Anxious Groups, High State Anxious and Low Trait Anxious Groups.

	Group			
Type of Crowd	*HighTraitAnx*	*LowTraitAnx*	*HighStateAnx*	*LowStateAnx*
Angry	4.295	3.473	3.854	3.684
	(2.842)	(2.881)	(2.647)	(2.916)
Happy	4.023	3.690	3.843	3.678
	(2.692)	(3.051)	(2.528)	(2.991)
Neutral	4.043	3.662	3.886	3.664
	(2.745)	(2.892)	(2.693)	(2.774)

TABLE B-12

Means and (Standard Deviations) of mean GSR (uhmo) as a Function of Type of Crowd for High Rational / Low Experiential and High Experiential / Low Rational Groups.

.

	Group	
Type of Crowd	*HighRat LowExp*	*HighExp LowRat*
Angry	3.142	4.229
	(2.612)	(2.780)
Happy	2.904	3.975
	(2.204)	(2.965)
Neutral	3.147	3.860
	(2.714)	(2.618)

TABLE B-13

Means and (Standard Deviations) of mean GSR (uhmo) as a Function of Type of Crowd for Trait Anxiety x Decision-Making Style Groups.

	Group			
Type of Crowd	*HAR*	*LAR*	*HAE*	*LAE*
Angry	3.671	2.825	4.615	3.868
	(3.448)	(2.032)	(1.923)	(3.312)
Happy	3.159	2.752	3.722	4.211
	(2.657)	(1.969)	(1.835)	(3.786)
Neutral	3.394	2.300	3.994	3.736
	(3.068	(2.581)	(1.970)	(3.174)

TABLE B-14

Means and (Standard Deviations) of mean GSR (uhmo) as a Function of Type of Crowd for State Anxiety x Decision-Making Style Groups.

	Group			
Type of Crowd	*HAR*	*LAR*	*HAE*	*LAE*
Angry	4.573	2.120	4.780	4.047
	(3.550)	(.808)	(2.689)	(2.754)
Happy	4.190	1.986	4.472	3.816
	(2.812)	(.968)	(2.971)	(3.015)
Neutral	4.613	2.100	4.142	3.770
	(3.513)	(1.288)	(2.534)	(2.697)

APPENDIX C

FIGURE CAPTIONS

Figure D-1. A representation of the results of Byrne and Eysenck (1995) demonstrating a significant Group x Target interaction for Anxious versus Non-Anxious participants in a Face-in-the-Crowd study.

Figure D-2. A representation of the results of Gilboa- Schechtman and colleagues (1999) demonstrating a significant Group x Target interaction for Social Phobics versus Non-Anxious Controls in a Face-in-the-Crowd study.

Figure D 3. Schematic outline of the multi-process Affect Infusion Model (AIM). The flowchart illustrates the hierarchical relationships among factors determining processing choices, and the multiple informational and processing influences of affect on judgments (Forgas, 1995).

Figure D-4. An example of an angry target in a neutral crowd.

Figure D-5. An example of a happy target in a neutral crowd.

Figure D-6. A representation of the results for the second hypothesis of Study One (trait anxiety and angry versus happy targets in neutral crowds). It shows a significant interaction effect of Anxiety x Target on RT.

Figure D-7. A representation of the results for the second hypothesis of Study One (state anxiety and angry versus happy targets in neutral crowds). It shows a significant between subjects effect of Anxiety on RT.

Figure D-8. A representation of the results for the second hypothesis of Study One (state anxiety and angry targets in happy crowds versus happy targets in angry crowds). It shows a significant between subjects effect of Anxiety on RT.

A representation of the results for the second hypothesis of Study Two (state anxiety and happy targets in angry crowds versus angry targets in happy crowds). It shows a significant between subjects effect of Anxiety on RT.

Figure D-9. A representation of the results for the third hypothesis of Study One (decision-making style and angry versus happy targets in neutral crowds). It shows a trend toward a significant main effect of Decision-Making Style on RT; it shows a significant simple effect of Decision-Making Style on RT for angry targets.

Figure D-10. A representation of the results for the third hypothesis of Study One (decision-making style and angry targets in happy crowds versus happy targets in angry crowds). It shows a significant main effect of Decision-Making Style on RT; it shows a significant simple effect of Decision-Making Style on RT for happy targets.

A representation of the results for the third hypothesis of Study Two (decision-making style and happy targets in angry crowds versus angry targets in happy crowds). It shows a significant main effect of Decision-Making Style on RT; it shows a significant simple effect of Decision-Making Style on RT for angry crowds.

Figure D-11. A representation of the results for the fourth hypothesis of Study One (omnibus ANOVA for trait anxiety x decision-making style for angry versus happy targets in neutral crowds). It shows no significant main, interaction or simple effects of Anxiety x Decision-Making Style on RT.

Figure D-12. A representation of the results for the fourth hypothesis of Study One (omnibus ANOVA for state anxiety x decision-making style for angry versus happy targets in neutral crowds). It shows a significant between subjects effect for HAR versus LAE groups.

Figure D-13. A representation of the results for the fourth hypothesis of Study One (omnibus ANOVA for trait anxiety x decision-making style for angry targets in happy crowds versus happy targets in angry crowds). It shows no significant main, interaction or simple effects of Anxiety x Decision-Making Style on RT.

A representation of the results for the fourth hypothesis of Study Two (omnibus ANOVA for trait anxiety x decision-making style for happy targets in angry crowds versus angry targets in happy crowds). It shows a trend toward a simple effect of Anxiety x Decision-Making Style on RT for HAE versus HAR groups for angry crowds; it shows a trend toward a significant simple effect of Anxiety x Decision-Making Style on RT for LAE versus LAR groups for angry crowds.

Figure D-14. A representation of the fourth hypothesis of Study One (omnibus ANOVA for state anxiety x decision-making style for angry targets in happy crowds versus happy targets in angry crowds). It shows a significant between subjects effect for HAR versus LAE groups. It shows a significant between subjects effect for LAR versus LAE groups.

A representation of the fourth hypothesis of Study Two (omnibus ANOVA for state anxiety x decision-making style for happy targets in angry crowds versus angry targets in happy crowds). It shows a significant between subjects effect for LAE versus LAR groups; it shows a significant simple effect of Anxiety x Decision-Making Style for LAE versus LAR groups for angry crowds.

Figure D-15. A representation of the seventh hypothesis of Study One (decision-making style x target on GSR). It shows a significant interaction effect; it shows a simple effect of target for the Rational group.

Figure D-16. A representation of the results for the eighth hypothesis of Study One (omnibus ANOVA for trait anxiety x decision-making style for angry versus happy targets in neutral crowds on GSR). It shows a significant interaction effect for LAE versus LAR groups; it shows a significant simple effect of target type for the LAR group.

Figure D-17. A representation of the results for the eighth hypothesis of Study One (omnibus ANOVA for state anxiety x decision-making style for angry versus happy targets in neutral crowds on GSR). It shows a significant interaction effect for LAE versus LAR groups; it shows a significant simple effect of target type for the LAR group.

Figure D-18. A representation of the results for the second hypothesis of Study Two (state anxiety and neutral targets in angry versus happy crowds). It shows a significant interaction effect of Anxiety x Crowd on RT; it shows a significant simple effect of anxiety for angry crowds; it shows a significant simple effect of target for the High Anxious group.

Figure D-19. A representation of the results for the second hypothesis of Study Two (state anxiety and no target trials in angry versus happy crowds). It shows a significant between subjects effect of Anxiety x Crowd on RT.

Figure D-20. A representation of the results for the third hypothesis of Study Two (decision-making style and neutral targets in angry versus happy crowds). It shows a trend toward a significant between subjects effect of Decision-Making Style on RT; it shows a significant simple effect of Decision-Making Style on RT for angry crowds.

Figure D-21. A representation of the results for the third hypothesis of Study Two (decision-making style and no target trials in angry versus happy crowds). It shows a trend toward a significant between subjects effect of Decision-Making Style on RT; it shows a significant interaction effect of Decision-Making Style on RT; it shows a significant simple effect of decision-making style on RT for angry crowds; it show a significant simple effect of crowd on RT for the Rational group.

Figure D-22. A representation of the results for the fourth hypothesis of Study Two (omnibus ANOVA for trait anxiety x decision-making style for neutral targets in angry versus happy crowds). It shows a trend toward a significant simple effect of Anxiety x Decision-Making Style on RT for LAE versus LAR groups in angry crowds.

Figure D-23. A representation of the results for the fourth hypothesis of Study Two (omnibus ANOVA for state anxiety x decision-making style for neutral targets in angry versus happy crowds). It shows no significant main, interaction or simple effects of Anxiety x Decision-Making Style on RT.

Figure D-24. A representation of the results for the fourth hypothesis of Study Two (omnibus ANOVA for trait anxiety x decision-making style for no target trials in angry versus happy crowds). It shows a significant Group x Crowd interaction; it shows a significant simple effect of Anxiety x Decision-Making Style on RT for HAE versus LAR groups for angry crowds; it shows a significant simple effect of Anxiety x Decision-Making Style on RT for LAE versus LAR groups for angry crowds;

Figure D-25. A representation of the results for the fourth hypothesis of Study Two (omnibus ANOVA for state anxiety x decision-making style for no target trials in angry versus happy crowds). It shows a significant Group x Crowd interaction; it shows a significant simple effect of Anxiety x Decision-Making Style on RT for LAE versus LAR groups.

Figure D-26. A representation of the results for the sixth hypothesis of Study Two (crowd x trait anxiety on GSR). It shows a significant interaction effect of Anxiety x Crowd on GSR; it shows a trend toward a simple effect of Crowd on GSR for the High Anxious group.

Figure D-27. A representation of the results for the eighth hypothesis of Study Two (omnibus ANOVA for trait anxiety x decision-making style for neutral targets in angry versus happy crowds on GSR). It shows a significant interaction effect for HAE versus LAR groups; it shows a significant simple effect of crowd for the HAE group; it shows a significant simple effect of HAE vs LAR group for angry crowds;

Figure D-28. A representation of the results for the eighth hypothesis of Study Two (omnibus ANOVA for state anxiety x decision-making style for angry versus happy targets in neutral crowds on GSR). It shows a significant between subjects effect for the LAE versus LAR groups; it shows a significant between subjects effect for the LAE versus LAR groups.

APPENDIX D

FIGURES

FIGURE D-1

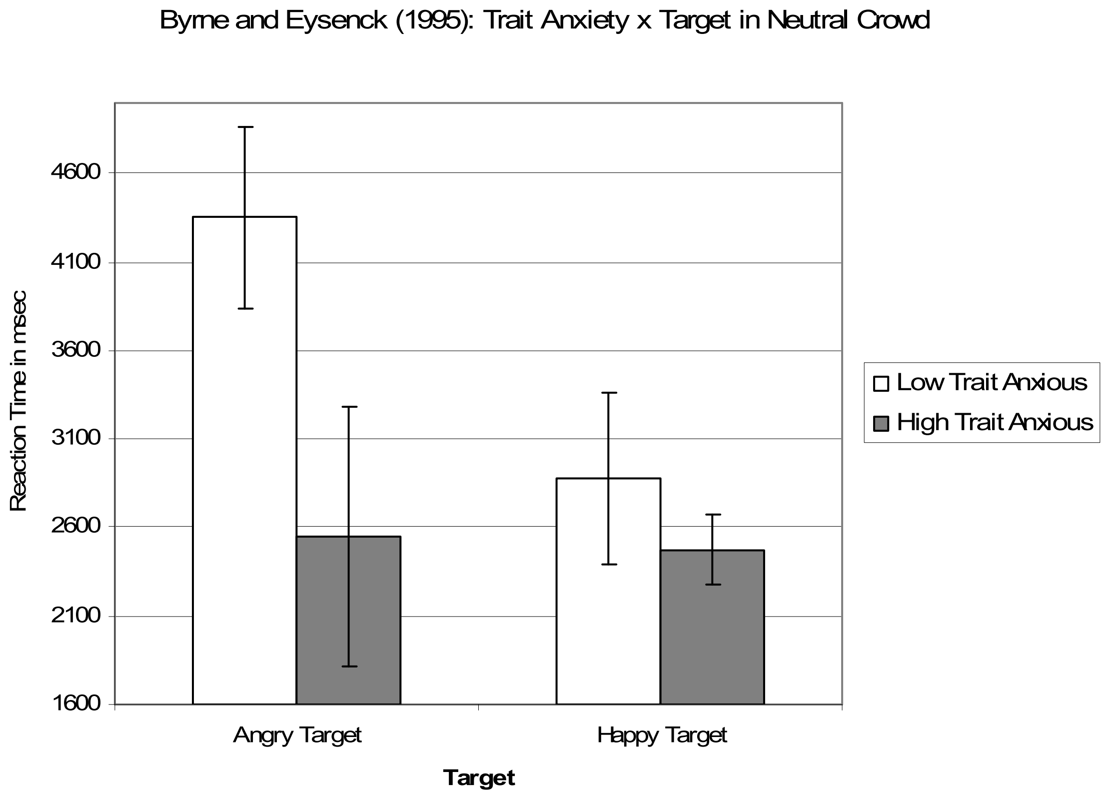


FIGURE D-2

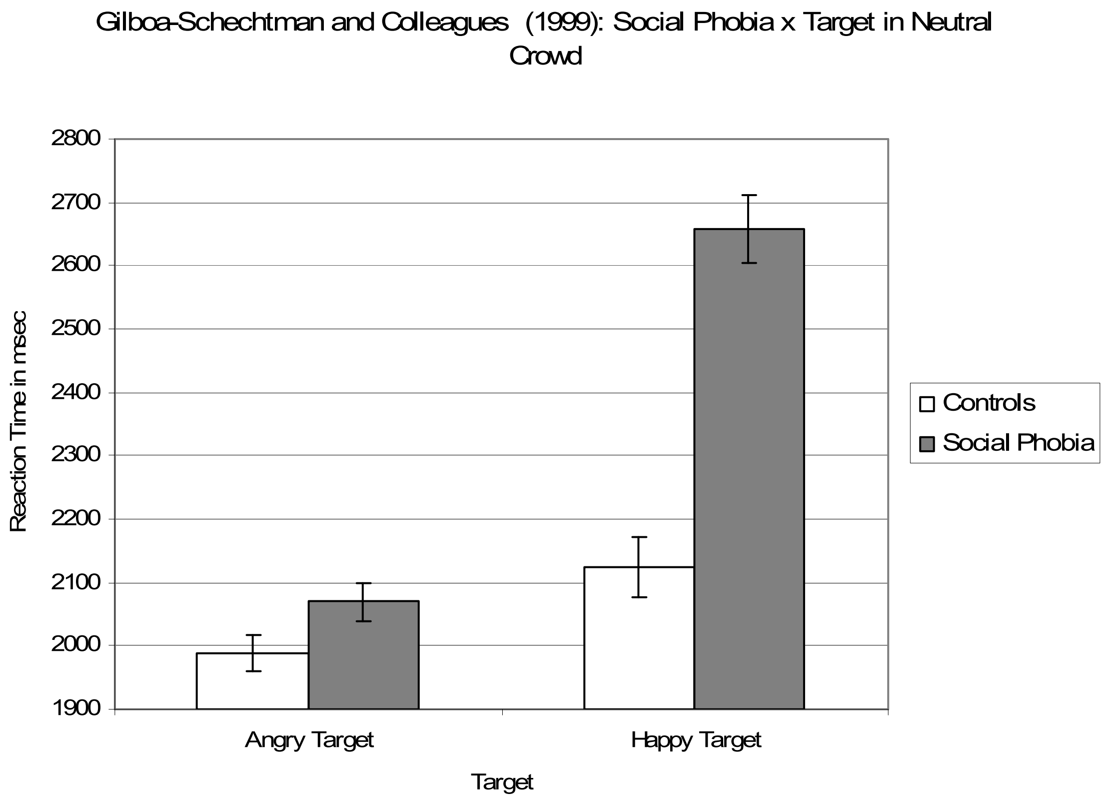

Gilboa-Schechtman and Colleagues (1999): Social Phobia x Target in Neutral Crowd
2800
2700
2600
2500
2400
2300
2200
2100
2000
1900
Reaction Time in msec
Angry Target
Happy Target
Target
Controls
Social Phobia

FIGURE D-3

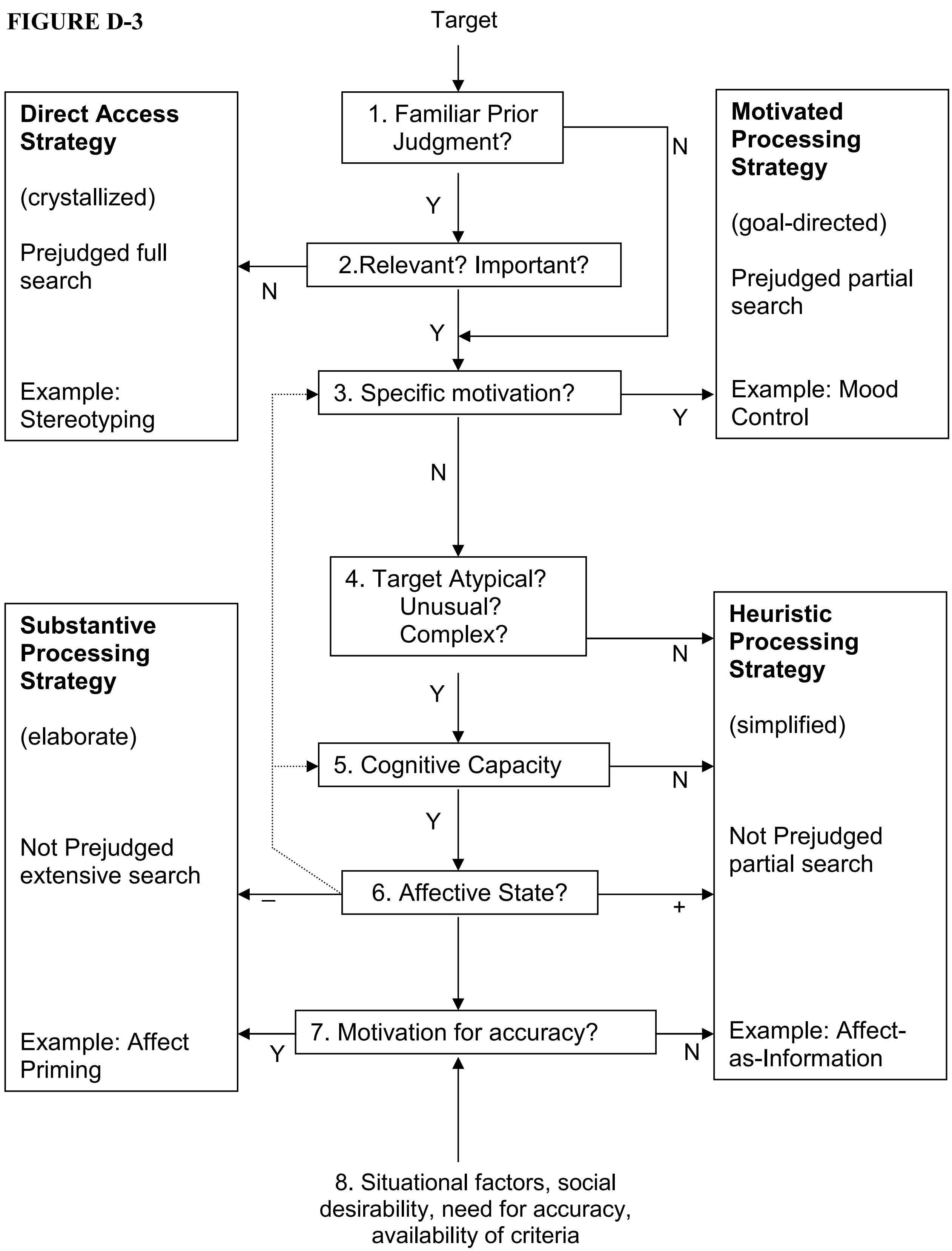
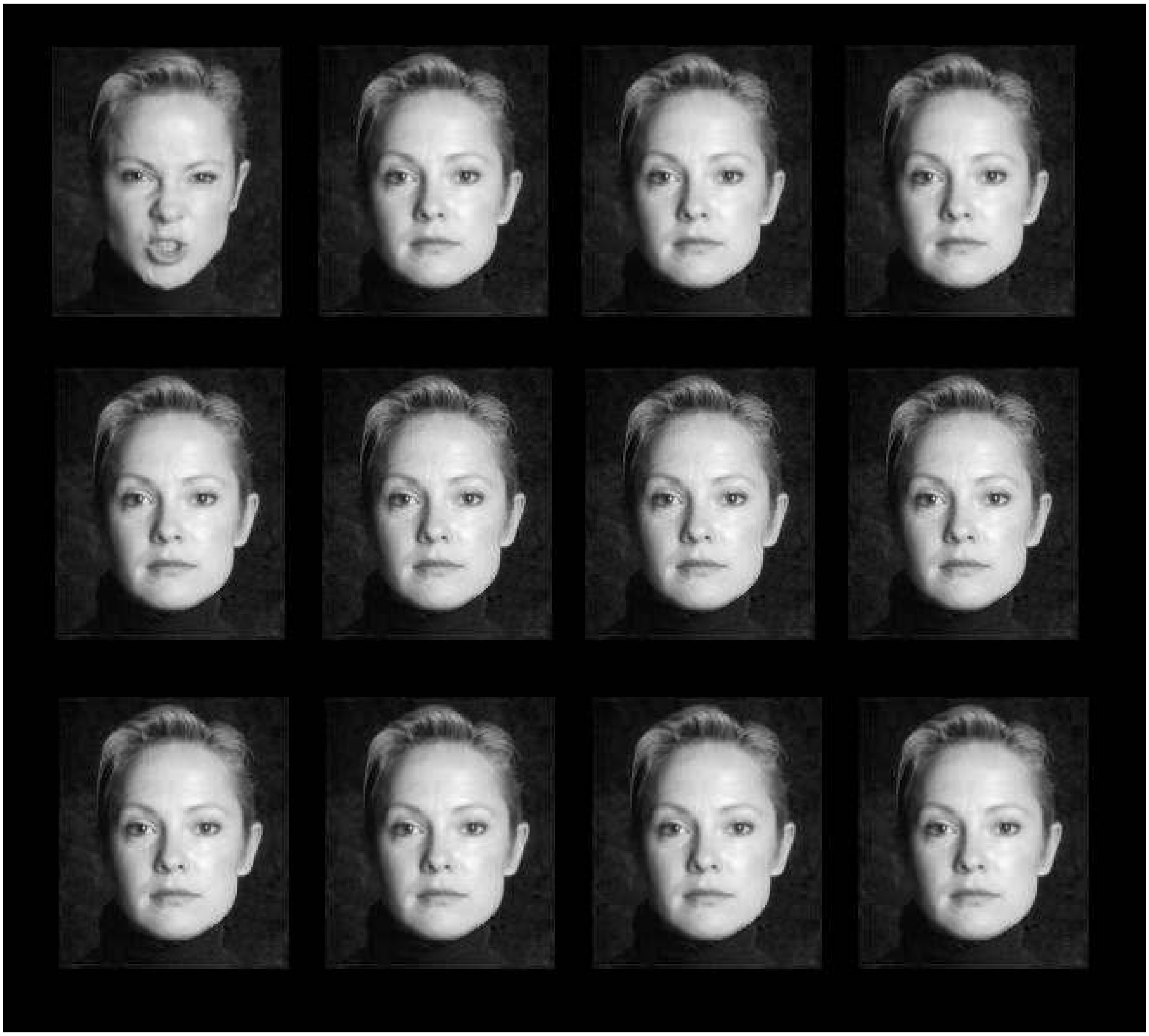
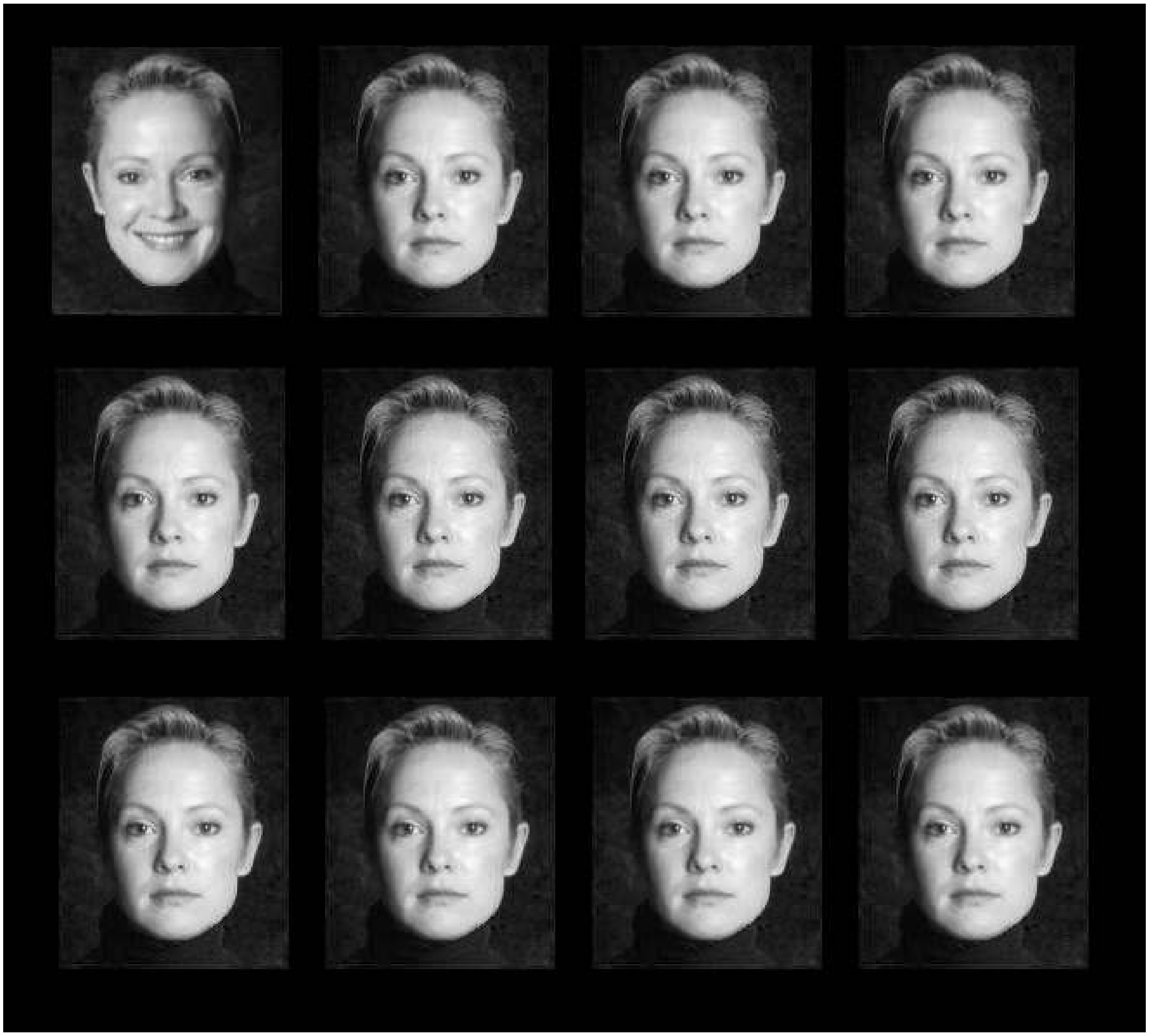

Target
1. Familiar Prior Judgment?
N
Y
2.Relevant? Important?
N
Y
3. Specific motivation?
Y
N
4. Target Atypical? Unusual? Complex?
N
Y
5. Cognitive Capacity
N
Y
6. Affective State?
–
+
7. Motivation for accuracy?
Y
N
8. Situational factors, social desirability, need for accuracy, availability of criteria
Direct Access Strategy
(crystallized)
Prejudged full search
Example: Stereotyping
Motivated Processing Strategy
(goal-directed)
Prejudged partial search
Example: Mood Control
Substantive Processing Strategy
(elaborate)
Not Prejudged extensive search
Example: Affect Priming
Heuristic Processing Strategy
(simplified)
Not Prejudged partial search
Example: Affect-as-Information

FIGURE D-4



Note. From Ekman pictures of facial affect (Ekman & Friesen, 1975).

FIGURE D-5



Note. From Ekman pictures of facial affect (Ekman & Friesen, 1975).

FIGURE D-6

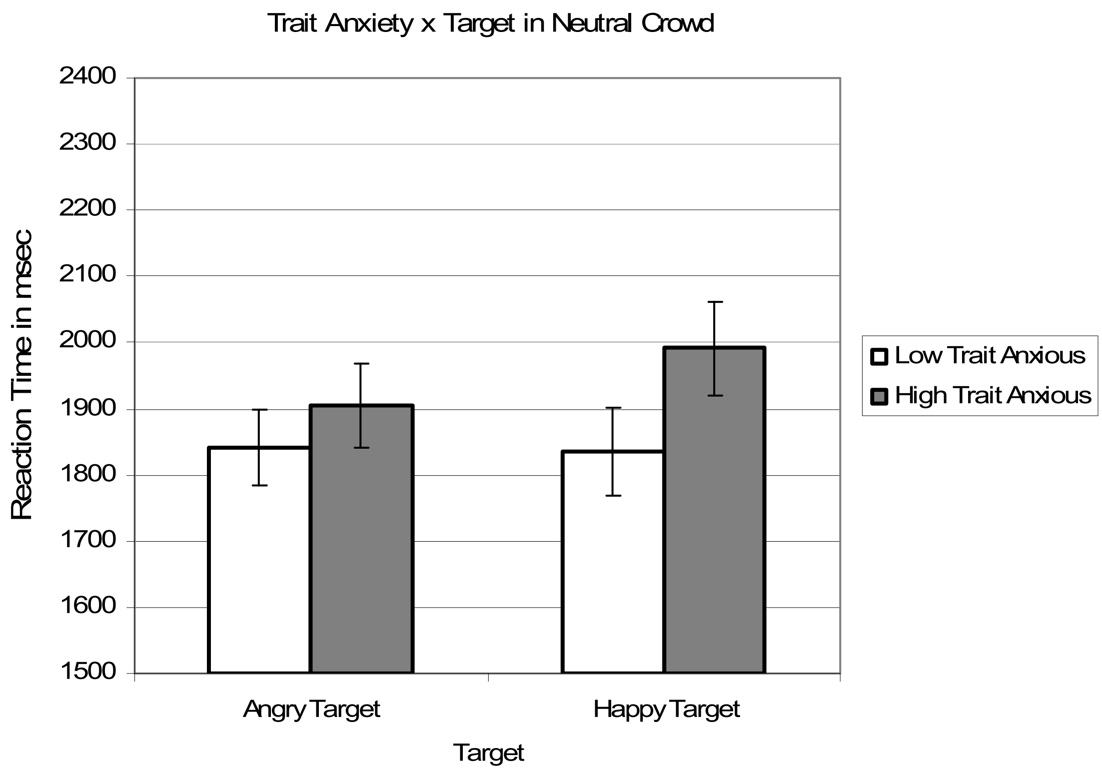
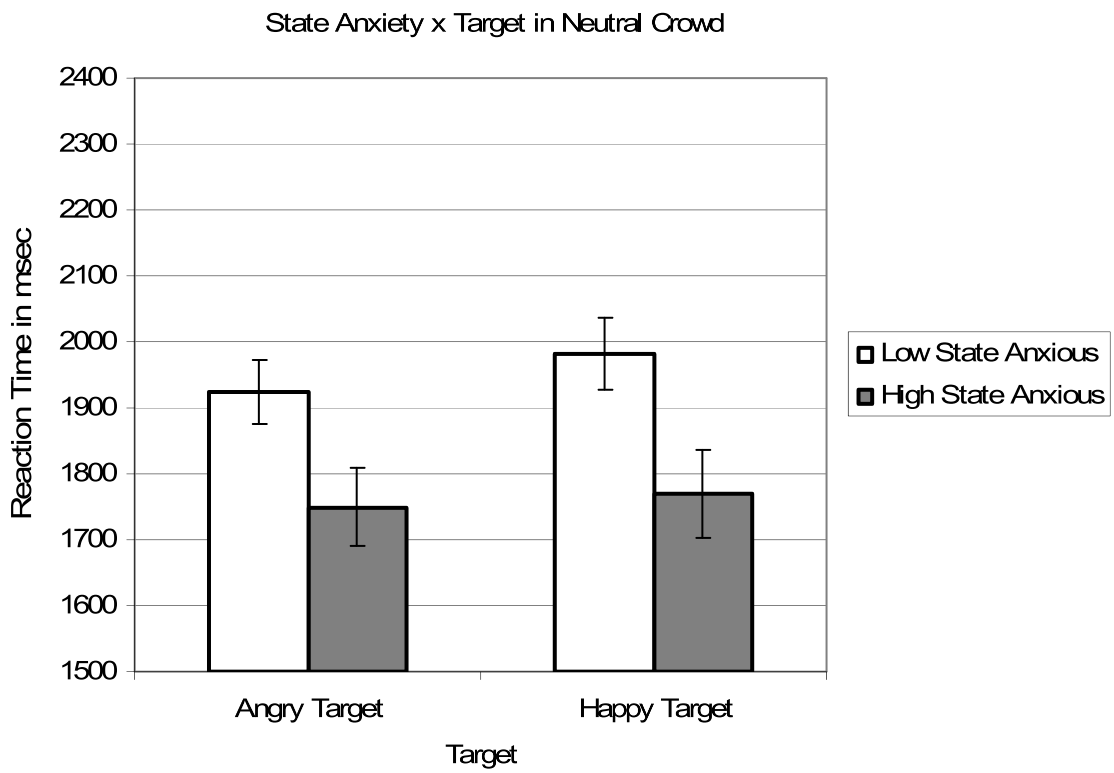

Trait Anxiety x Target in Neutral Crowd
Reaction Time in msec
2400
2300
2200
2100
2000
1900
1800
1700
1600
1500
Angry Target
Happy Target
Target
Low Trait Anxious
High Trait Anxious

FIGURE D-7



State Anxiety x Target in Neutral Crowd
2400
2300
2200
2100
2000
1900
1800
1700
1600
1500
Reaction Time in msec
Angry Target
Happy Target
Target
Low State Anxious
High State Anxious

FIGURE D-8

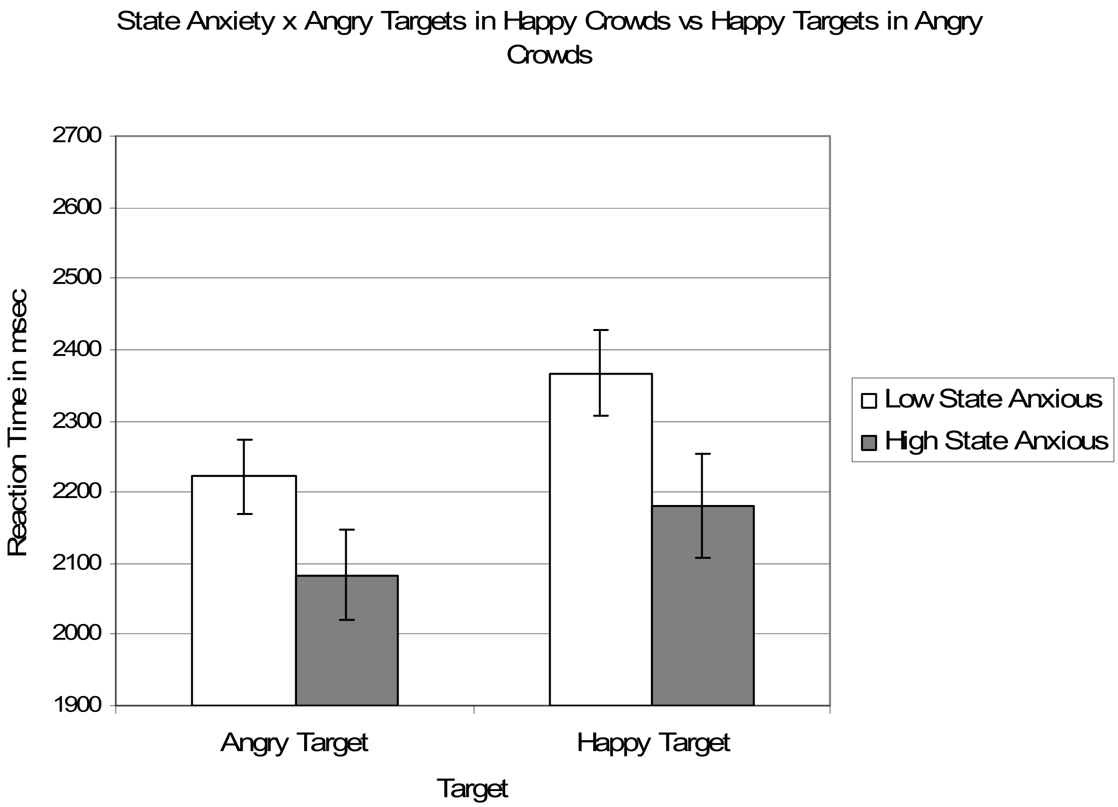

State Anxiety x Angry Targets in Happy Crowds vs Happy Targets in Angry Crowds
Reaction Time in msec
2700
2600
2500
2400
2300
2200
2100
2000
1900
Angry Target
Happy Target
Target
Low State Anxious
High State Anxious

FIGURE D-9

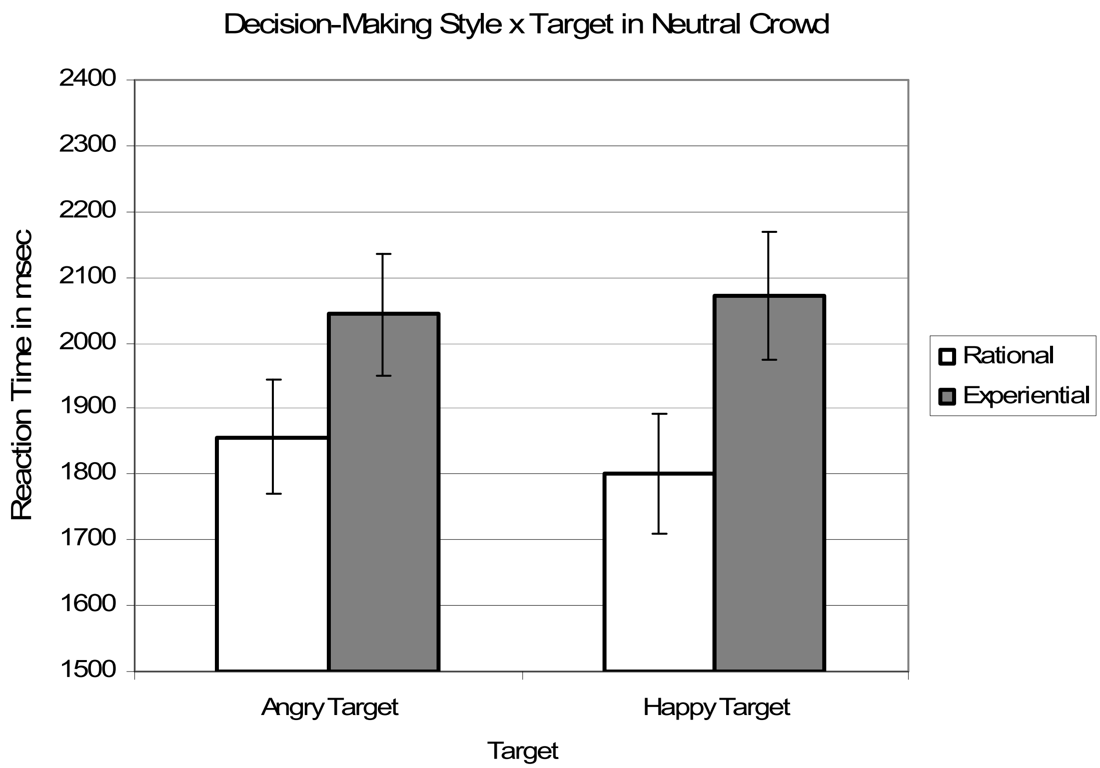

Decision-Making Style x Target in Neutral Crowd
2400
2300
2200
2100
2000
1900
1800
1700
1600
1500
Reaction Time in msec
Rational
Experiential
Angry Target
Happy Target
Target

FIGURE D-10

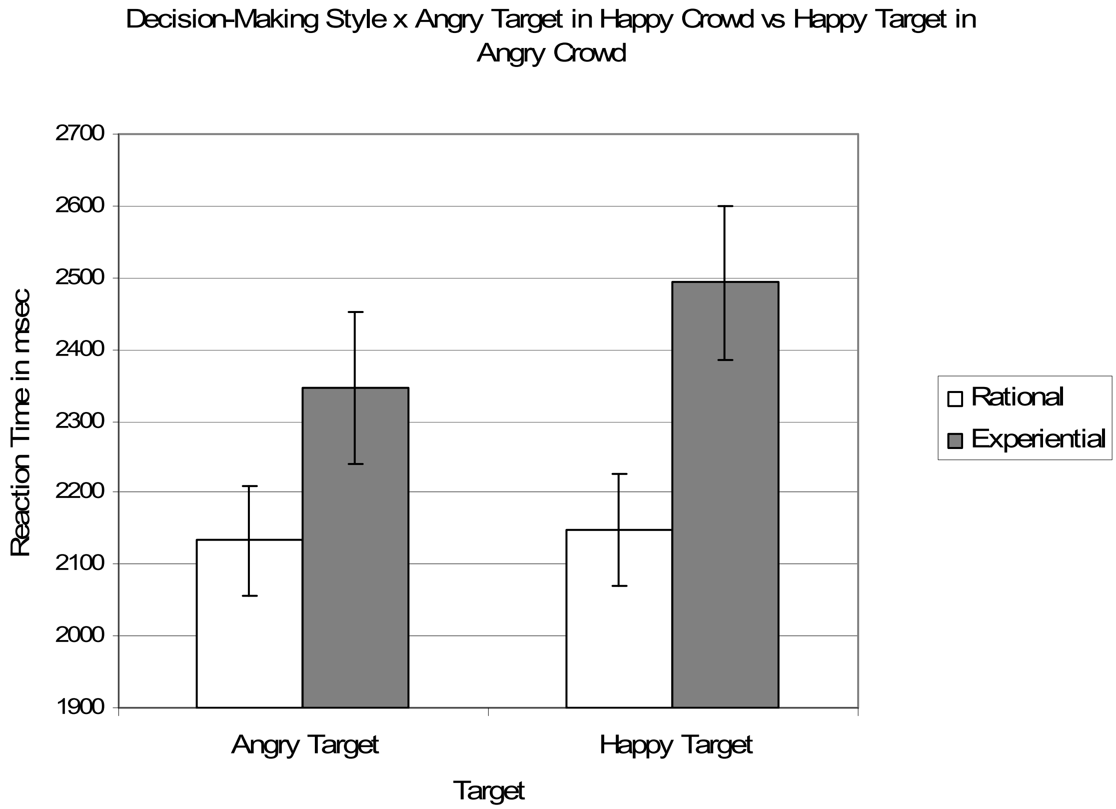

Decision-Making Style x Angry Target in Happy Crowd vs Happy Target in Angry Crowd
Reaction Time in msec
2700
2600
2500
2400
2300
2200
2100
2000
1900
Angry Target
Happy Target
Target
Rational
Experiential

FIGURE D-11

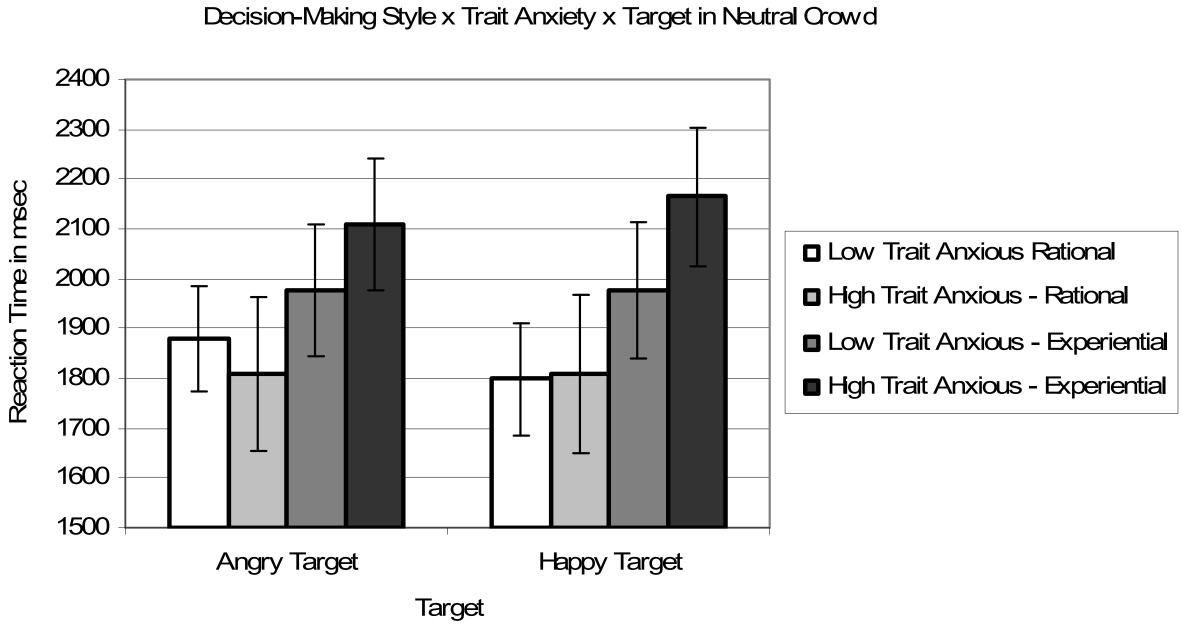

Decision-Making Style x Trait Anxiety x Target in Neutral Crowd
Reaction Time in msec
2400
2300
2200
2100
2000
1900
1800
1700
1600
1500
Angry Target
Happy Target
Target
Low Trait Anxious Rational
High Trait Anxious - Rational
Low Trait Anxious - Experiential
High Trait Anxious - Experiential

FIGURE D-12

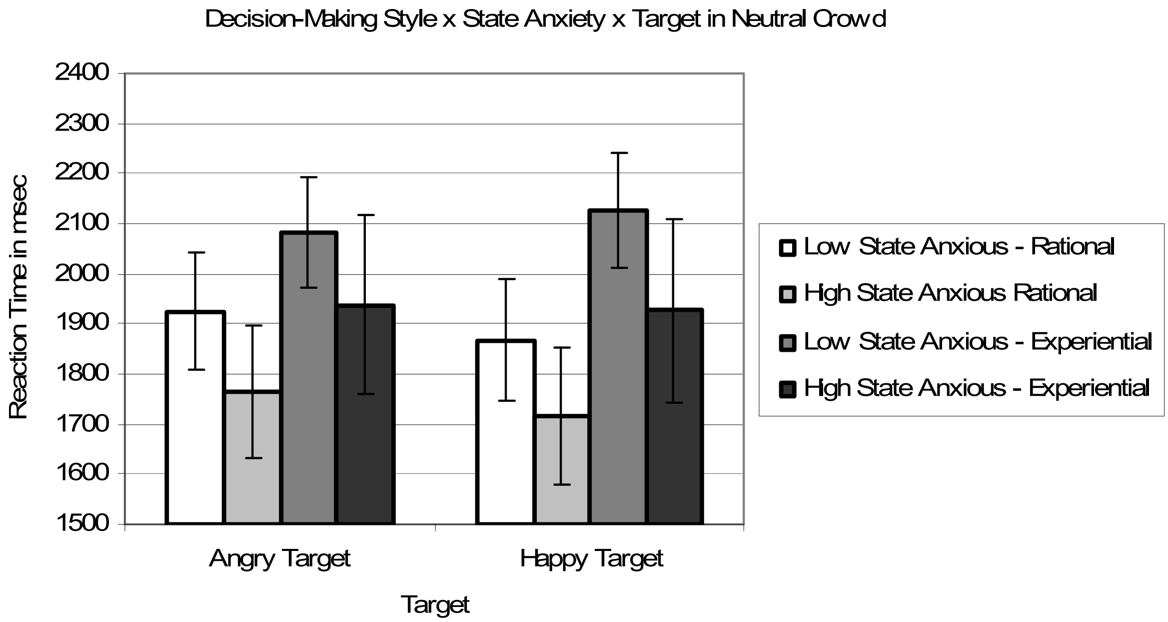

Decision-Making Style x State Anxiety x Target in Neutral Crowd
Reaction Time in msec
2400
2300
2200
2100
2000
1900
1800
1700
1600
1500
Angry Target
Happy Target
Target
Low State Anxious - Rational
Hgh State Anxious Rational
Low State Anxious - Experiential
Hgh State Anxious - Experiential

FIGURE D-13

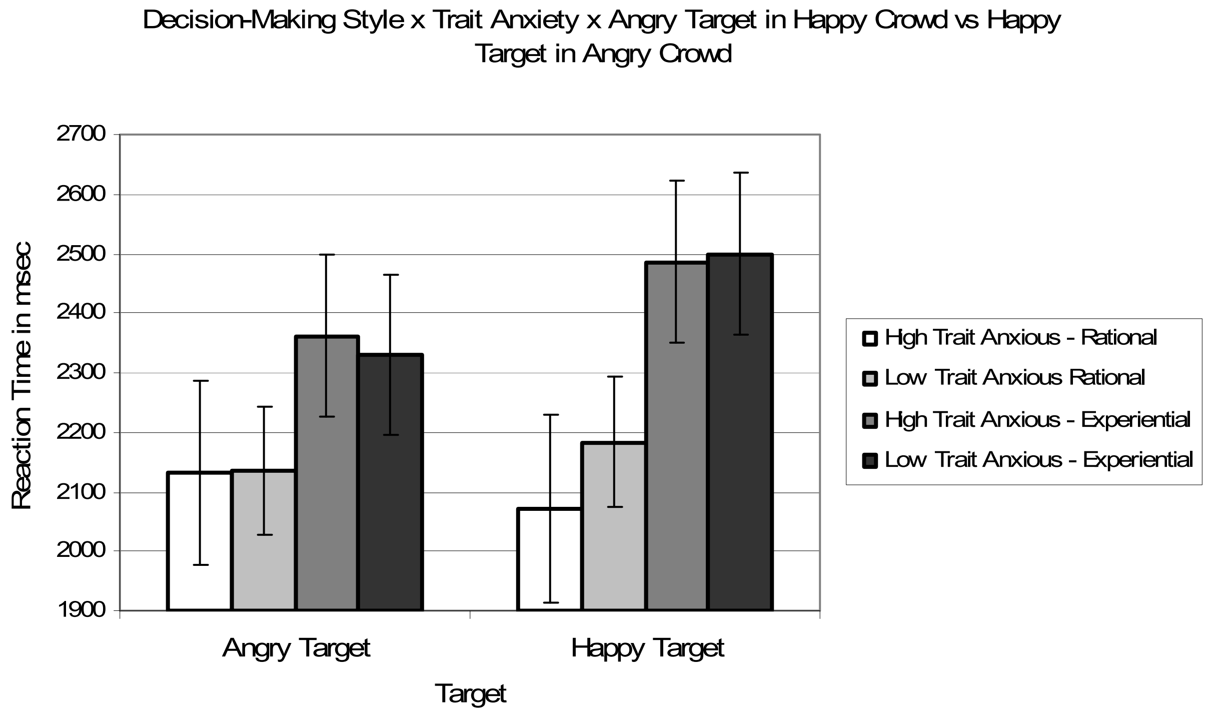
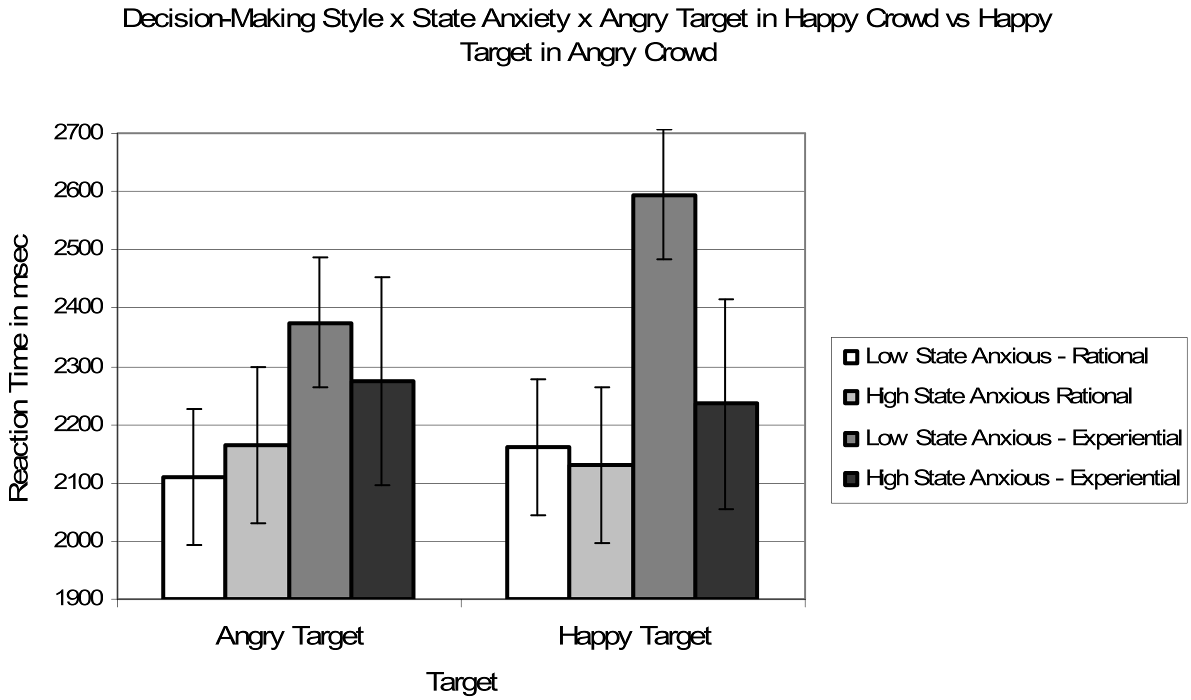

Decision-Making Style x Trait Anxiety x Angry Target in Happy Crowd vs Happy Target in Angry Crowd
2700
2600
2500
2400
2300
2200
2100
2000
1900
Reaction Time in msec
Angry Target
Happy Target
Target
Hgh Trait Anxious - Rational
Low Trait Anxious Rational
Hgh Trait Anxious - Experiential
Low Trait Anxious - Experiential

FIGURE D-14



Decision-Making Style x State Anxiety x Angry Target in Happy Crowd vs Happy Target in Angry Crowd
Reaction Time in msec
2700
2600
2500
2400
2300
2200
2100
2000
1900
Angry Target
Happy Target
Target
Low State Anxious - Rational
High State Anxious Rational
Low State Anxious - Experiential
High State Anxious - Experiential

FIGURE D-15

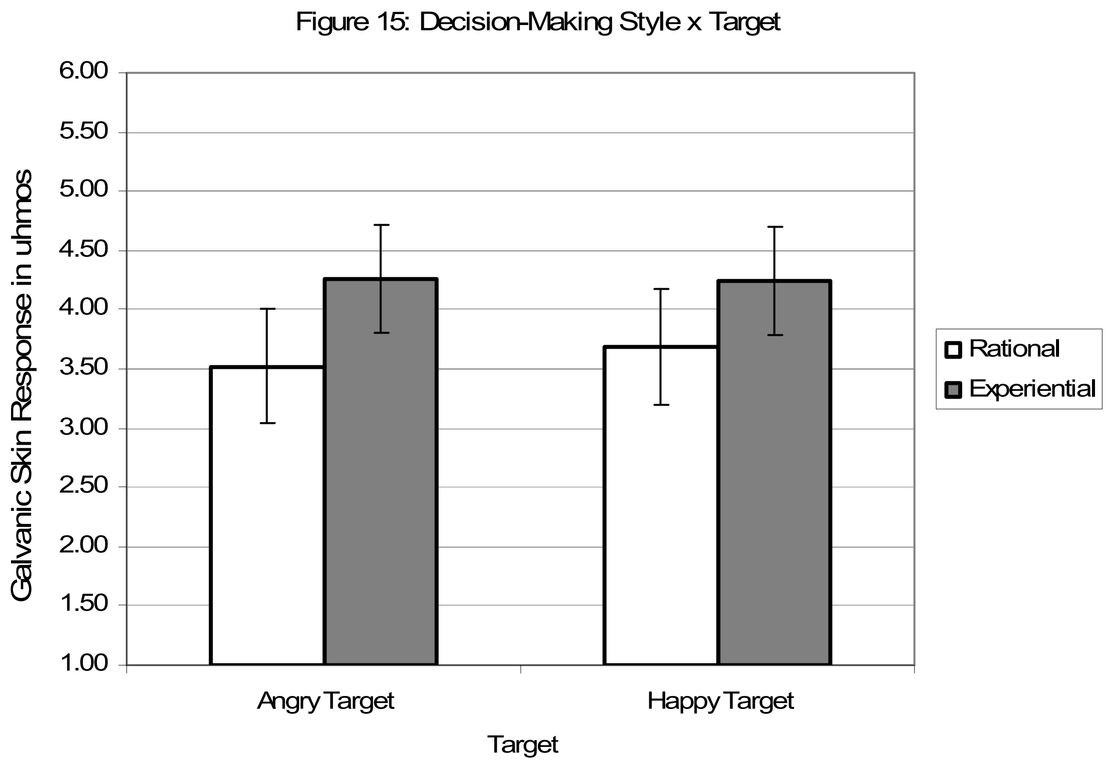
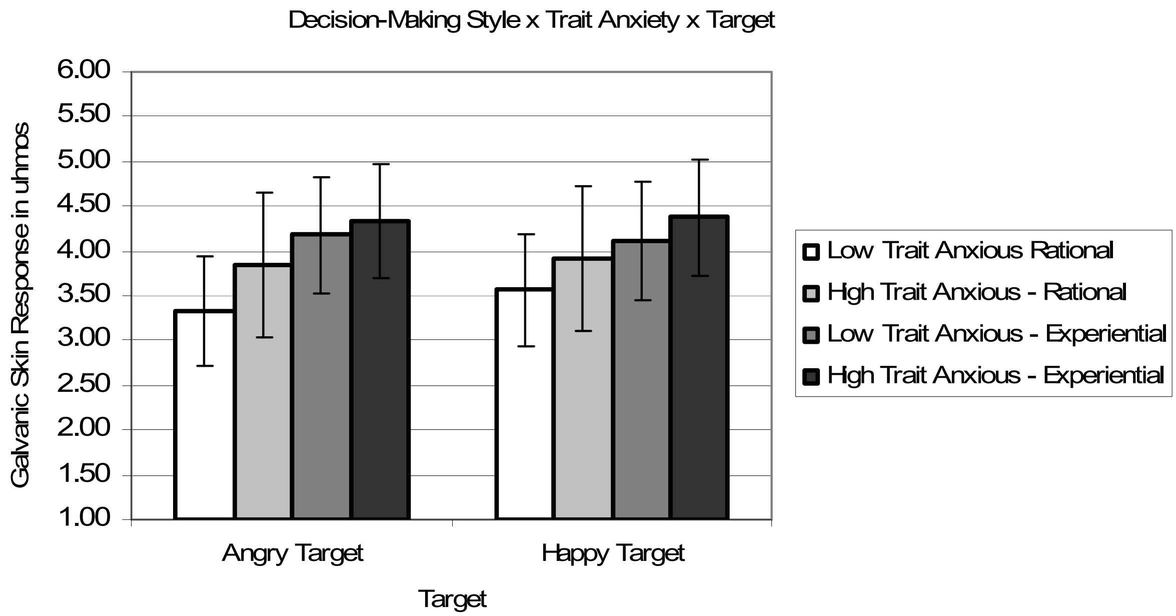


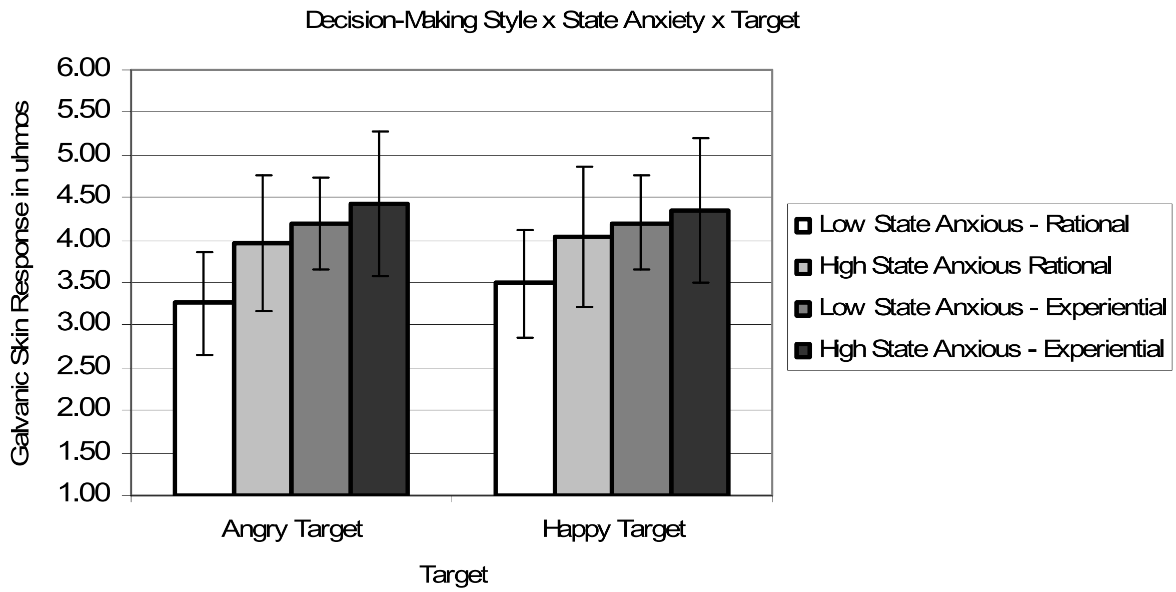
Figure 15: Decision-Making Style x Target
6.00
5.50
5.00
4.50
4.00
3.50
3.00
2.50
2.00
1.50
1.00
Galvanic Skin Response in uhmos
Angry Target
Happy Target
Target
Rational
Experiential

FIGURE D-16



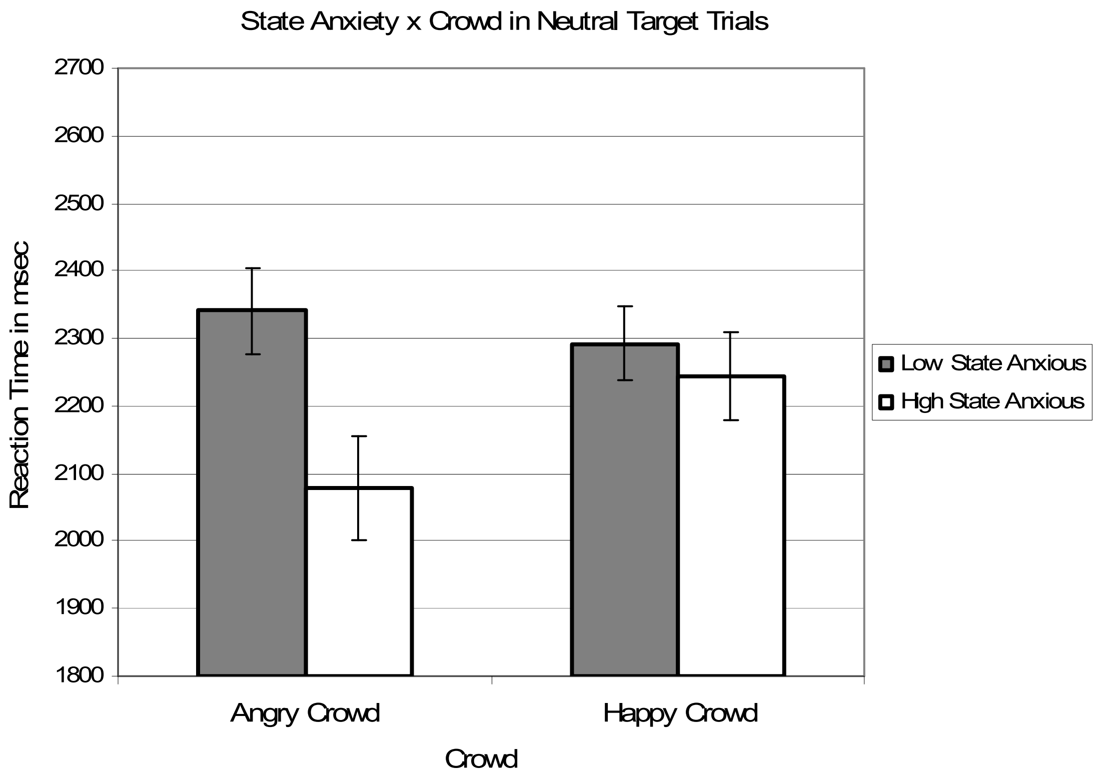
Decision-Making Style x Trait Anxiety x Target
Galvanic Skin Response in uhmos
6.00
5.50
5.00
4.50
4.00
3.50
3.00
2.50
2.00
1.50
1.00
Angry Target
Happy Target
Target
Low Trait Anxious Rational
High Trait Anxious - Rational
Low Trait Anxious - Experiential
High Trait Anxious - Experiential

FIGURE D-17



Decision-Making Style x State Anxiety x Target
Galvanic Skin Response in uhmos
6.00
5.50
5.00
4.50
4.00
3.50
3.00
2.50
2.00
1.50
1.00
Angry Target
Happy Target
Target
Low State Anxious - Rational
High State Anxious Rational
Low State Anxious - Experiential
High State Anxious - Experiential

FIGURE D-18



State Anxiety x Crowd in Neutral Target Trials
2700
2600
2500
2400
2300
2200
2100
2000
1900
1800
Reaction Time in msec
Angry Crowd
Happy Crowd
Crowd
Low State Anxious
Hgh State Anxious

FIGURE D-19

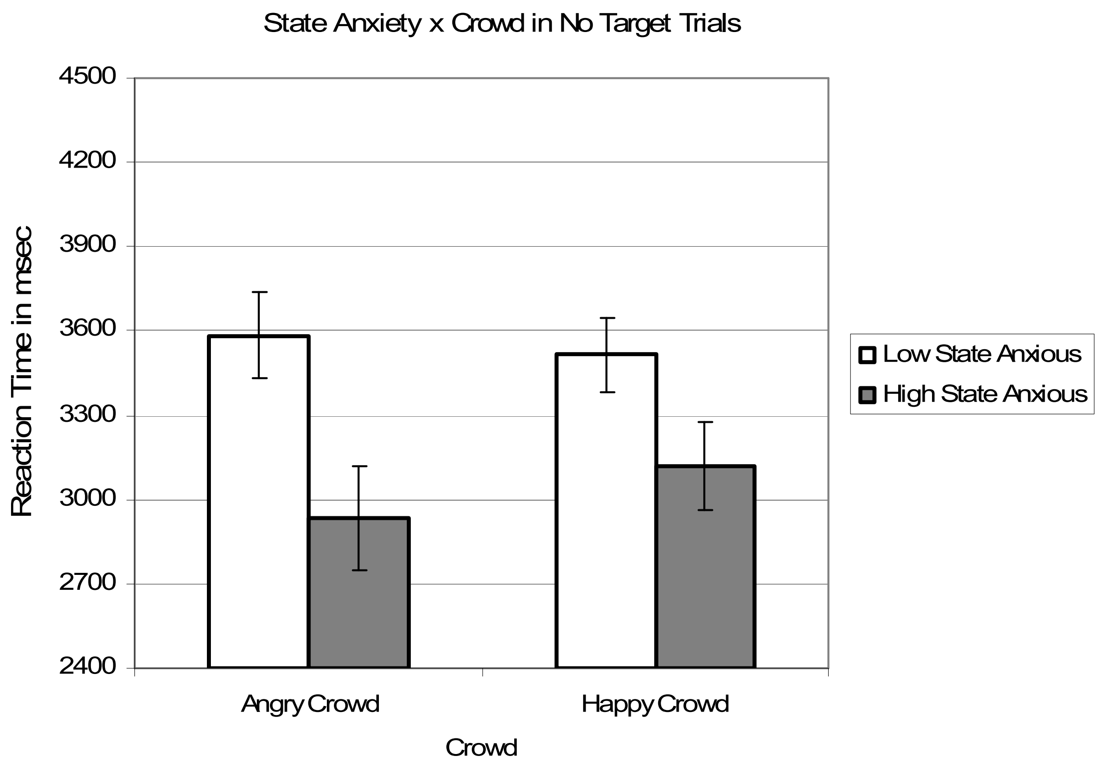

State Anxiety x Crowd in No Target Trials
4500
4200
3900
3600
3300
3000
2700
2400
Reaction Time in msec
Angry Crowd
Happy Crowd
Crowd
Low State Anxious
High State Anxious

FIGURE D-20

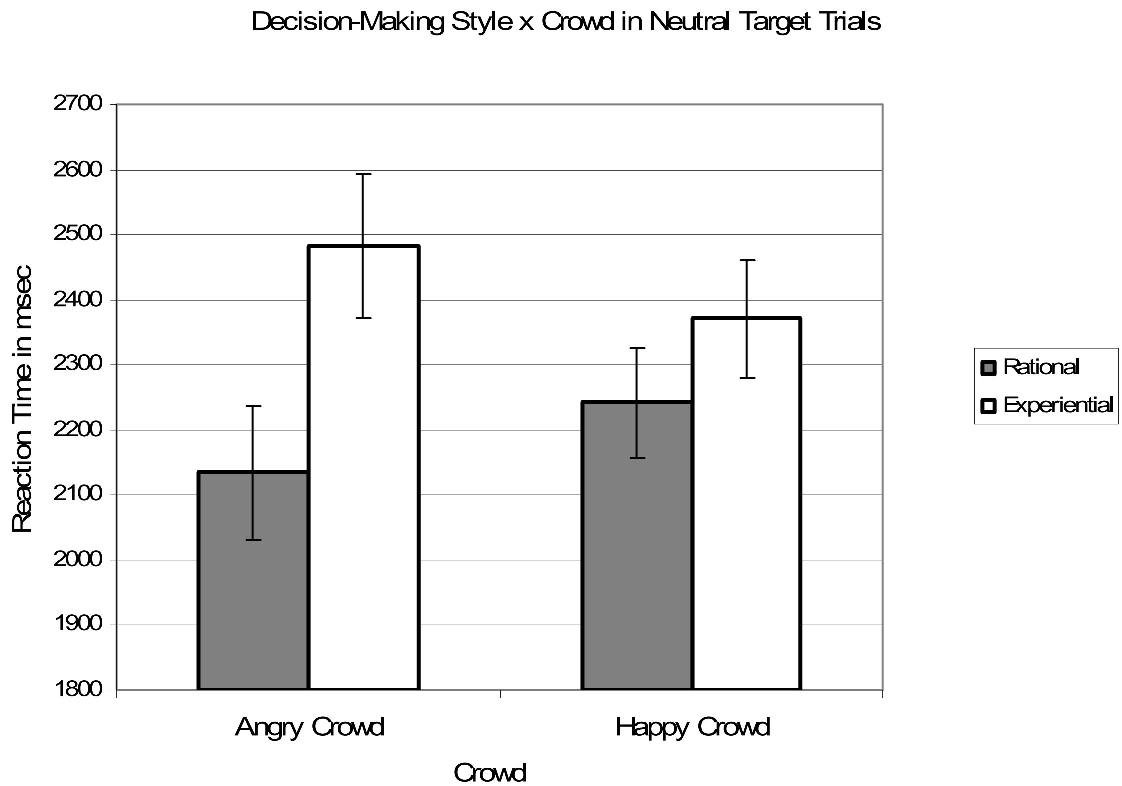

Decision-Making Style x Crowd in Neutral Target Trials
2700
2600
2500
2400
2300
2200
2100
2000
1900
1800
Reaction Time in msec
Angry Crowd
Happy Crowd
Crowd
Rational
Experiential

FIGURE D-21

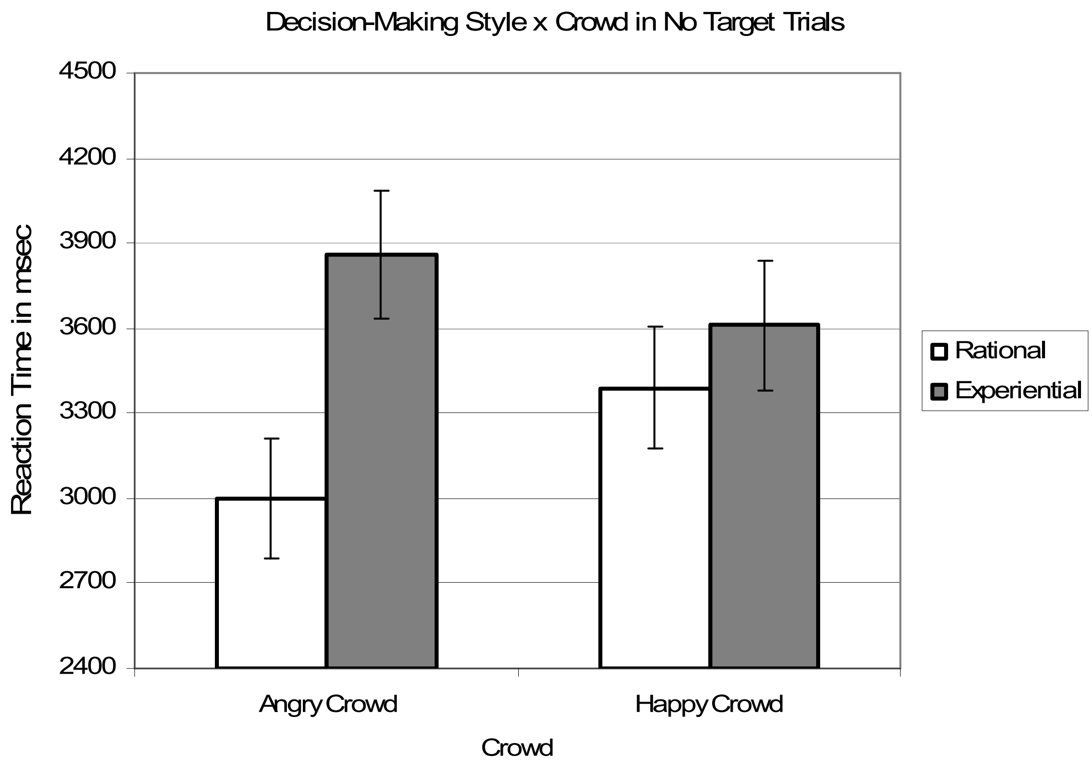

Decision-Making Style x Crowd in No Target Trials
4500
4200
3900
3600
3300
3000
2700
2400
Reaction Time in msec
Rational
Experiential
Angry Crowd
Happy Crowd
Crowd

FIGURE D-22

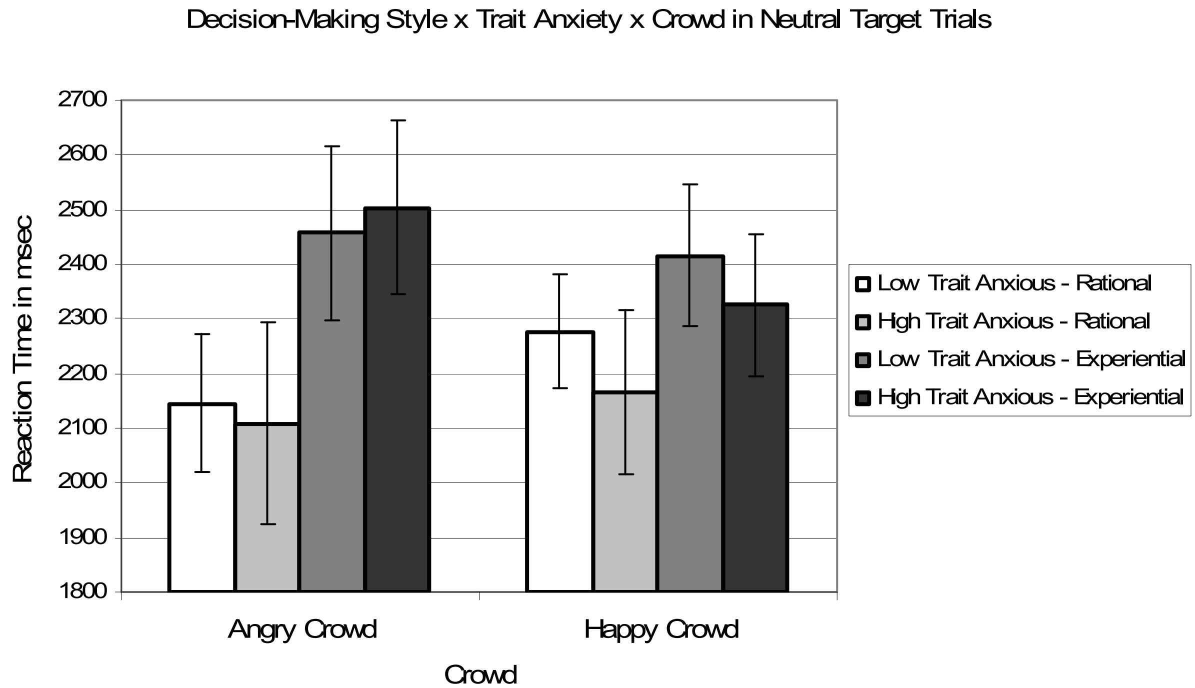
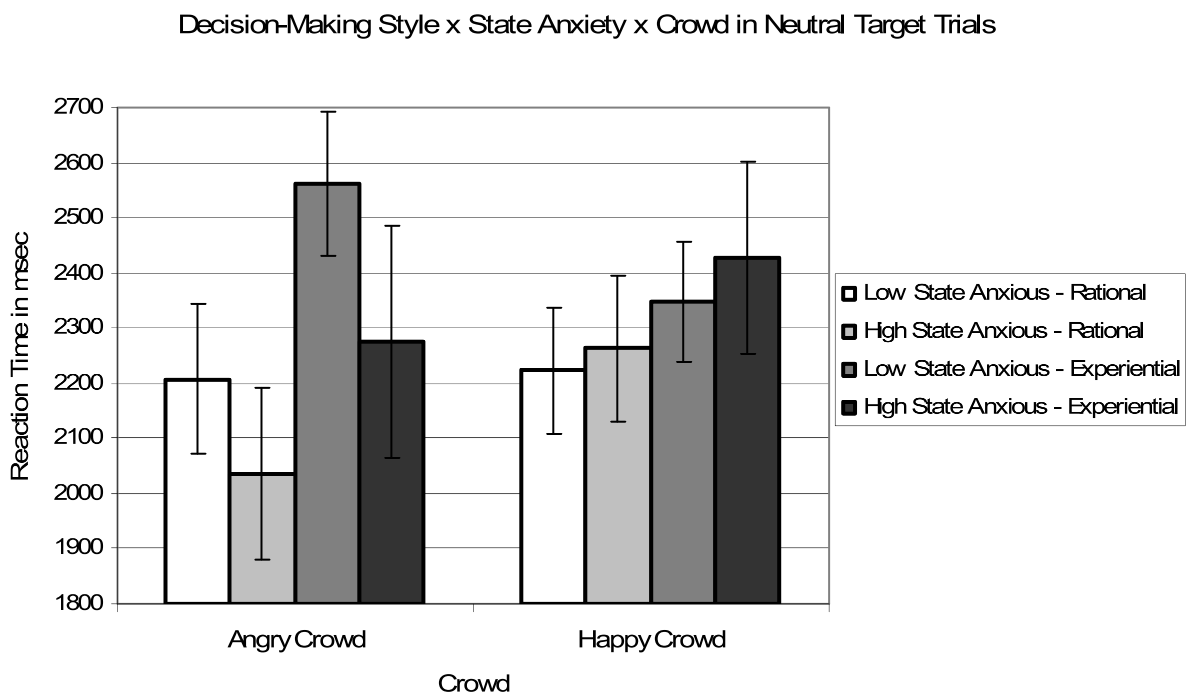

Decision-Making Style x Trait Anxiety x Crowd in Neutral Target Trials
2700
2600
2500
2400
2300
2200
2100
2000
1900
1800
Reaction Time in msec
Angry Crowd
Happy Crowd
Crowd
Low Trait Anxious - Rational
High Trait Anxious - Rational
Low Trait Anxious - Experiential
High Trait Anxious - Experiential

FIGURE D-23



Decision-Making Style x State Anxiety x Crowd in Neutral Target Trials
Reaction Time in msec
2700
2600
2500
2400
2300
2200
2100
2000
1900
1800
Angry Crowd
Happy Crowd
Crowd
Low State Anxious - Rational
High State Anxious - Rational
Low State Anxious - Experiential
High State Anxious - Experiential

FIGURE D-24

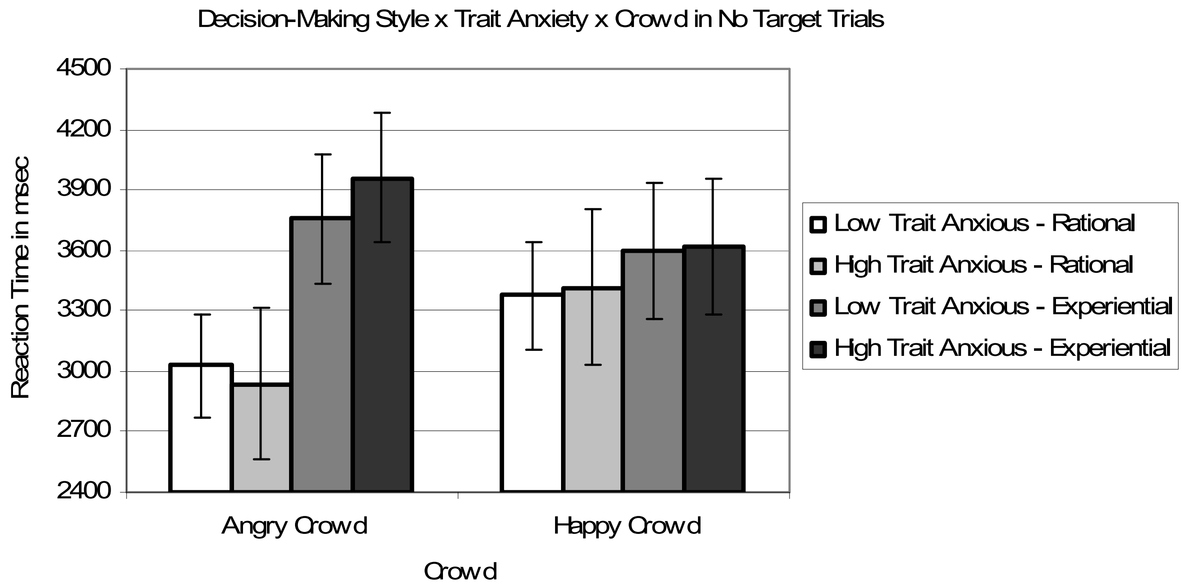

Decision-Making Style x Trait Anxiety x Crowd in No Target Trials
Reaction Time in msec
4500
4200
3900
3600
3300
3000
2700
2400
Angry Crowd
Happy Crowd
Crowd
Low Trait Anxious - Rational
High Trait Anxious - Rational
Low Trait Anxious - Experiential
High Trait Anxious - Experiential

FIGURE D-25

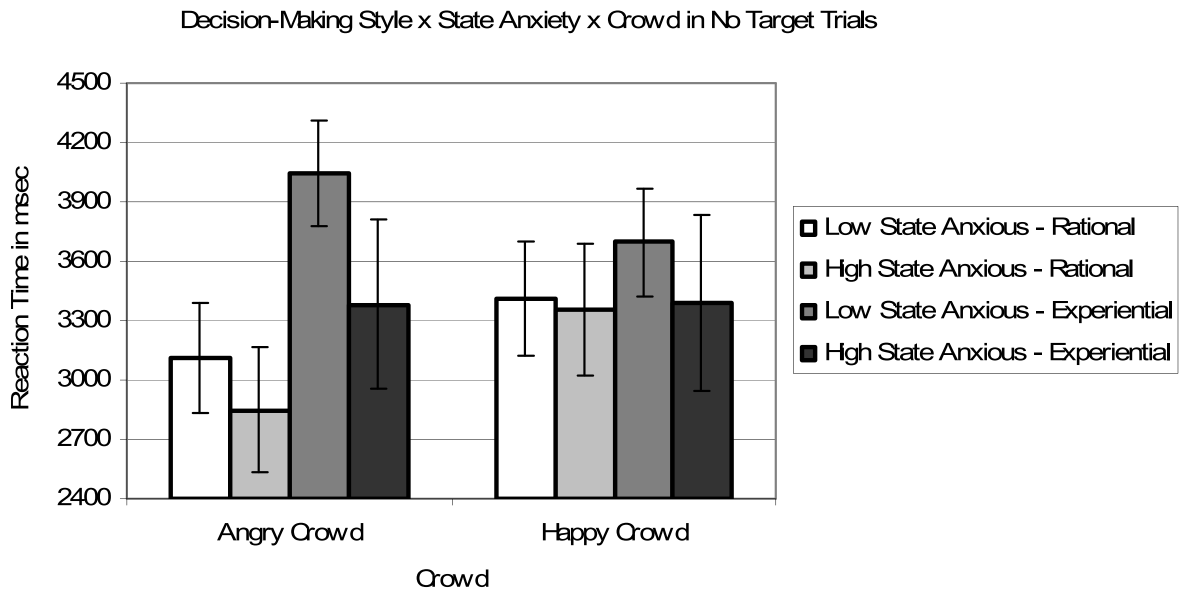

Decision-Making Style x State Anxiety x Crowd in No Target Trials
4500
4200
3900
3600
3300
3000
2700
2400
Reaction Time in msec
Angry Crowd
Happy Crowd
Crowd
Low State Anxious - Rational
High State Anxious - Rational
Low State Anxious - Experiential
High State Anxious - Experiential

FIGURE D-26

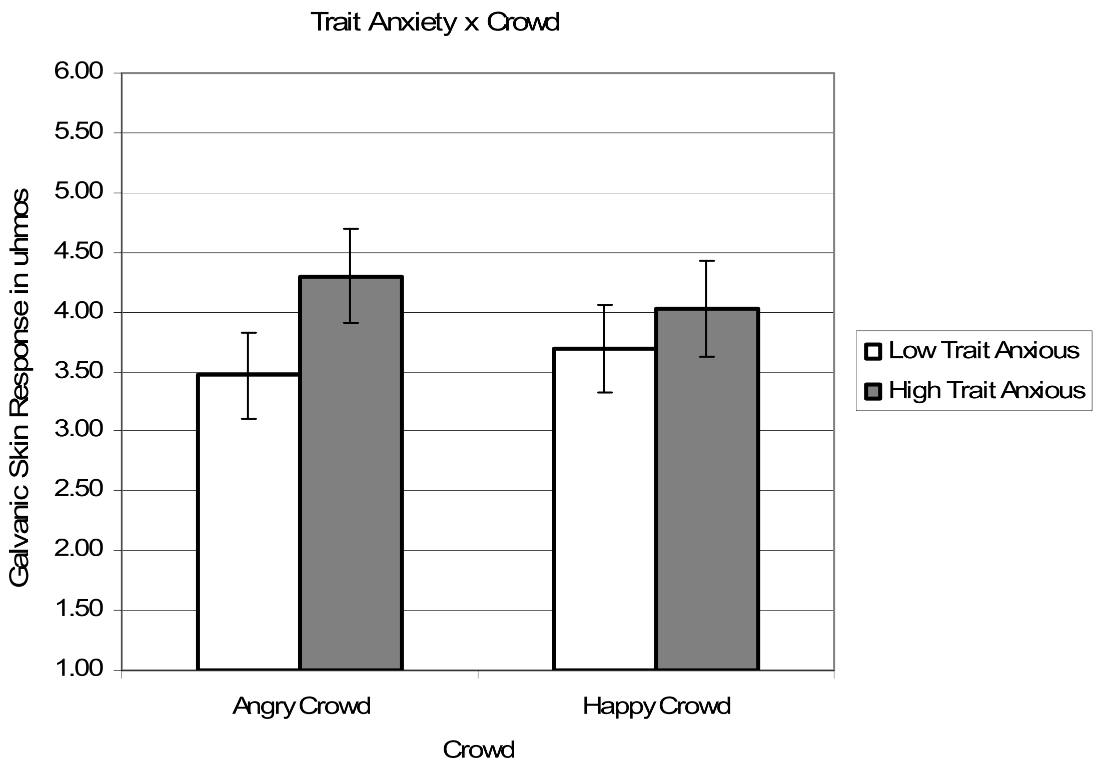
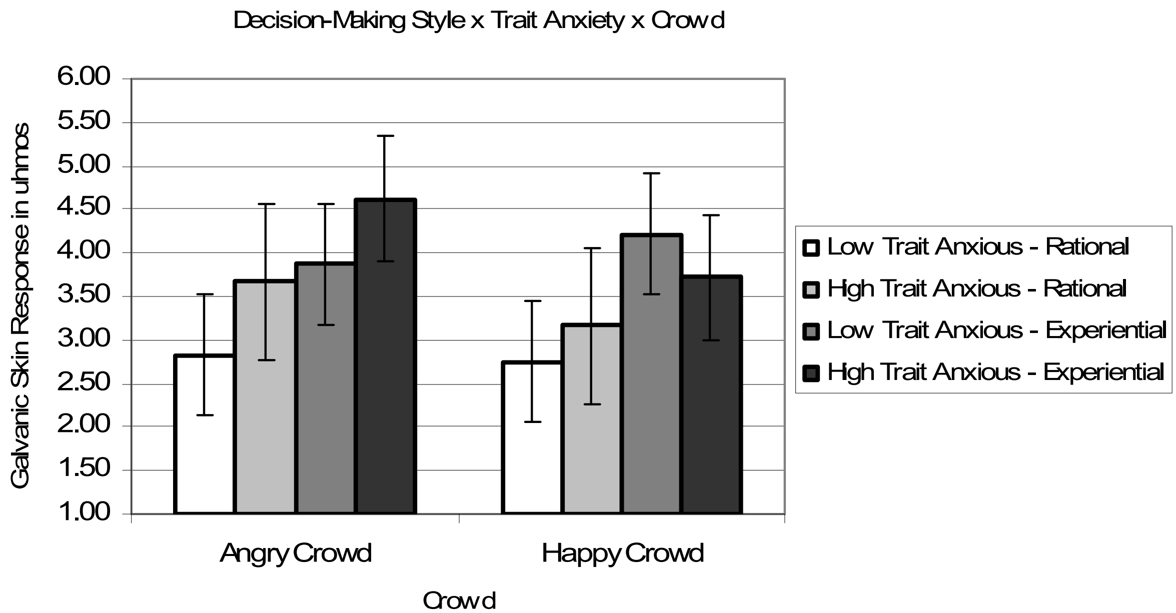
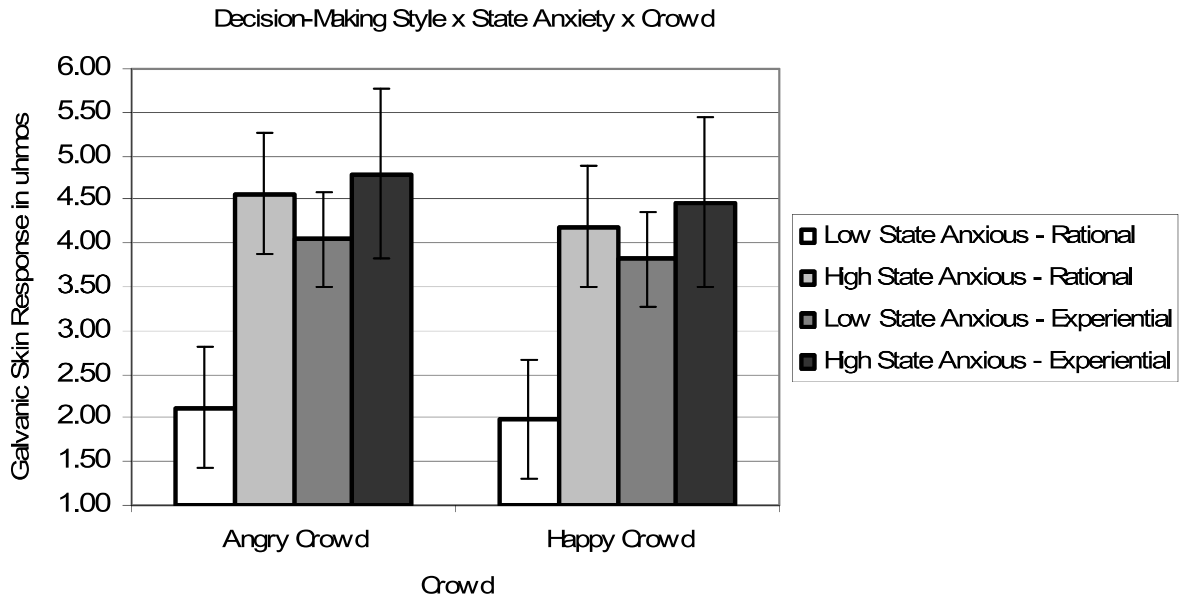

Trait Anxiety x Crowd
6.00
5.50
5.00
4.50
4.00
3.50
3.00
2.50
2.00
1.50
1.00
Galvanic Skin Response in uhmos
Angry Crowd
Happy Crowd
Crowd
Low Trait Anxious
High Trait Anxious

FIGURE D-27



Decision-Making Style x Trait Anxiety x Crowd
6.00
5.50
5.00
4.50
4.00
3.50
3.00
2.50
2.00
1.50
1.00
Galvanic Skin Response in uhmos
Angry Crowd
Happy Crowd
Crowd
Low Trait Anxious - Rational
High Trait Anxious - Rational
Low Trait Anxious - Experiential
High Trait Anxious - Experiential

FIGURE D-28


Decision-Making Style x State Anxiety x Crowd
Galvanic Skin Response in uhmos
6.00
5.50
5.00
4.50
4.00
3.50
3.00
2.50
2.00
1.50
1.00
Angry Crowd
Happy Crowd
Crowd
Low State Anxious - Rational
High State Anxious - Rational
Low State Anxious - Experiential
High State Anxious - Experiential